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Miller

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(54) **MULTI-PHASE, MULTI-COMPARTMENT, CAPSULAR DELIVERY APPARATUS AND METHODS FOR USING SAME**

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This patent is subject to a terminal disclaimer.

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(22) Filed: **Sep. 25, 2013**

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Related U.S. Application Data

(63) Continuation of application No. 13/746,743, filed on Jan. 22, 2013, now abandoned, which is a continuation of application No. 12/689,669, filed on Jan. 19, 2010, now Pat. No. 8,361,497, which is a continuation of application No. 10/804,576, filed on Mar. 19, 2004, now Pat. No. 7,670,612, which is a continuation-in-part of application No. PCT/US03/10816, filed on Apr. 9, 2003.

(60) Provisional application No. 60/371,448, filed on Apr. 10, 2002.

(51) **Int. Cl.**

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A61K 45/06	(2006.01)
A61J 3/07	(2006.01)
B29C 39/10	(2006.01)

(52) **U.S. Cl.**

CPC ***A61K 9/4808*** (2013.01); ***A61K 9/4833*** (2013.01); ***A61K 45/06*** (2013.01); ***B29C 39/10*** (2013.01); ***A61J 3/072*** (2013.01); ***A61J 3/074*** (2013.01)

(58) **Field of Classification Search**

CPC ... A61K 45/06; A61K 9/4808; A61K 9/4833; A61J 3/074; A61J 3/072

See application file for complete search history.

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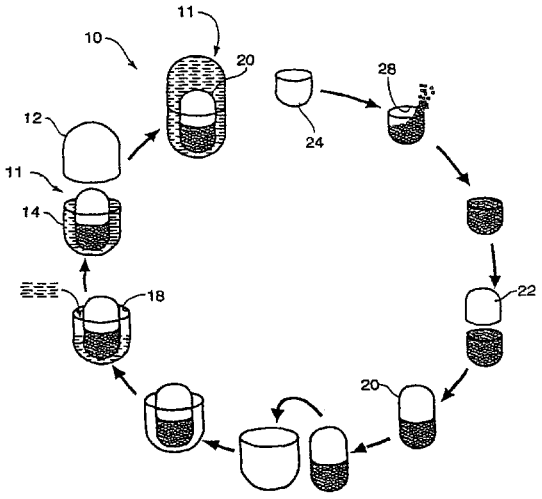
(57) **ABSTRACT**

A multi-compartment capsule, comprising, a first receiving chamber comprising at least one ingredient having a first physical state, wherein said ingredient is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral; and a second receiving chamber comprising at least one ingredient having a second physical state, wherein said ingredient is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral; wherein said first physical state of said ingredient of said first receiving chamber being different from said second physical state of said ingredient of said second receiving chamber; and said ingredient of said first receiving chamber being different from said ingredient of said second receiving chamber.

17 Claims, 13 Drawing Sheets



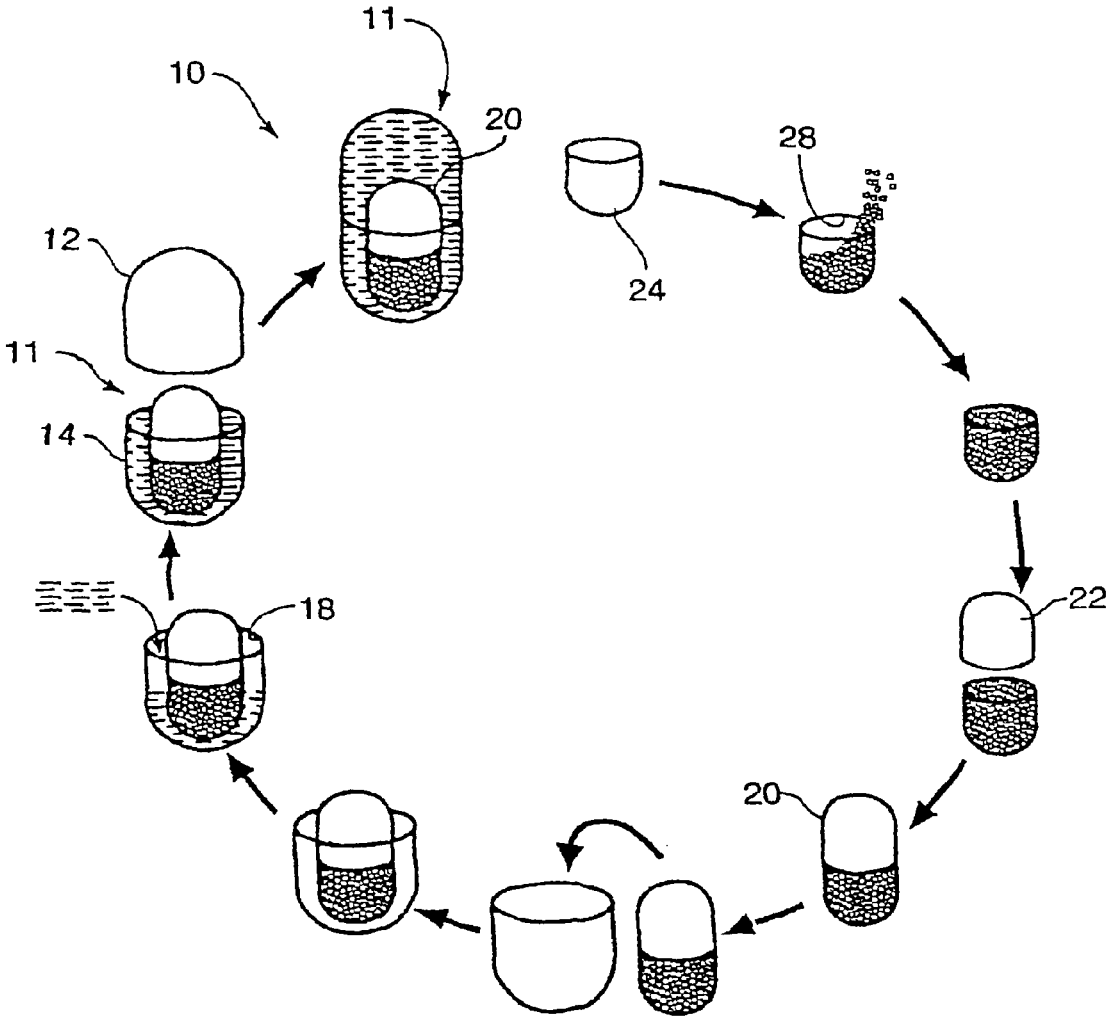


FIG. 1

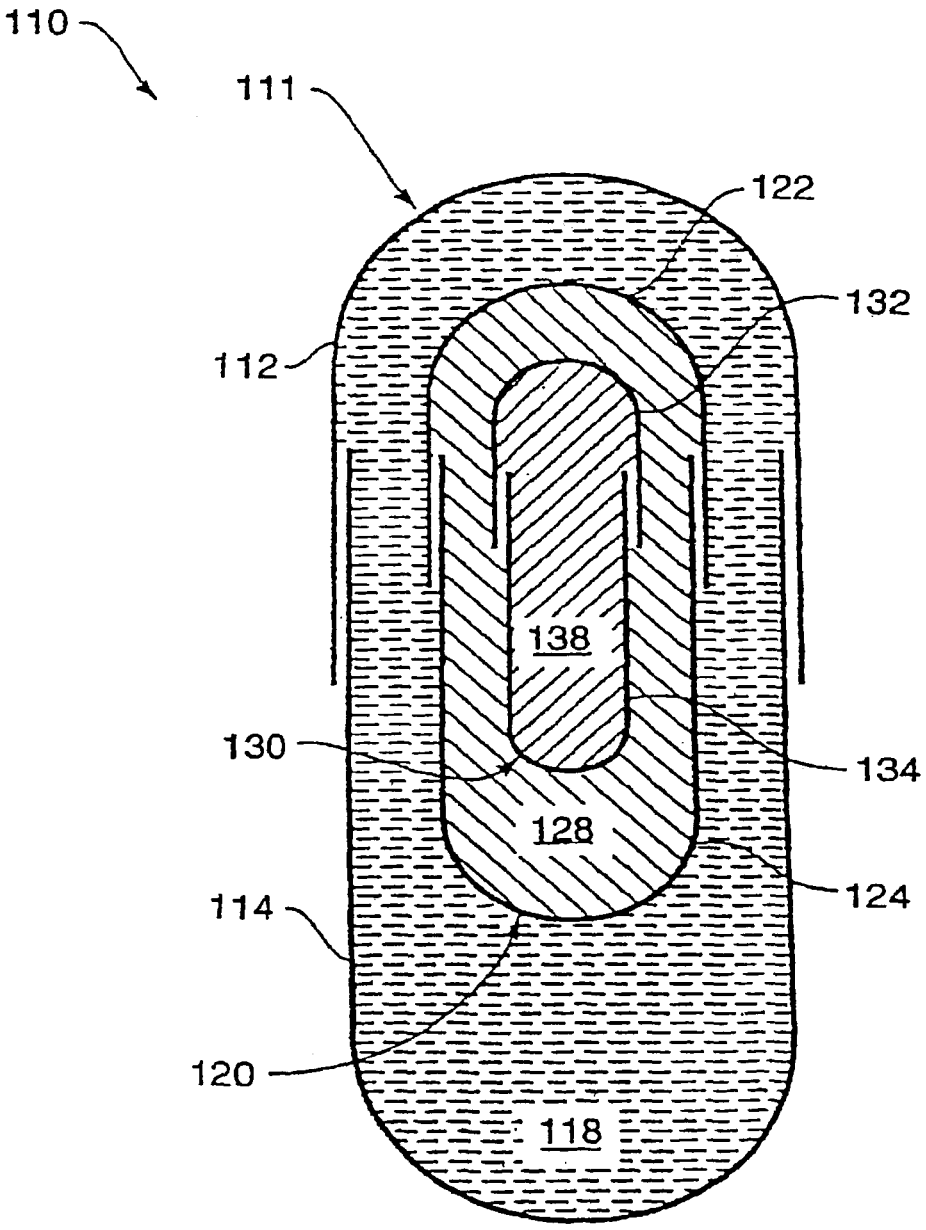


FIG. 2

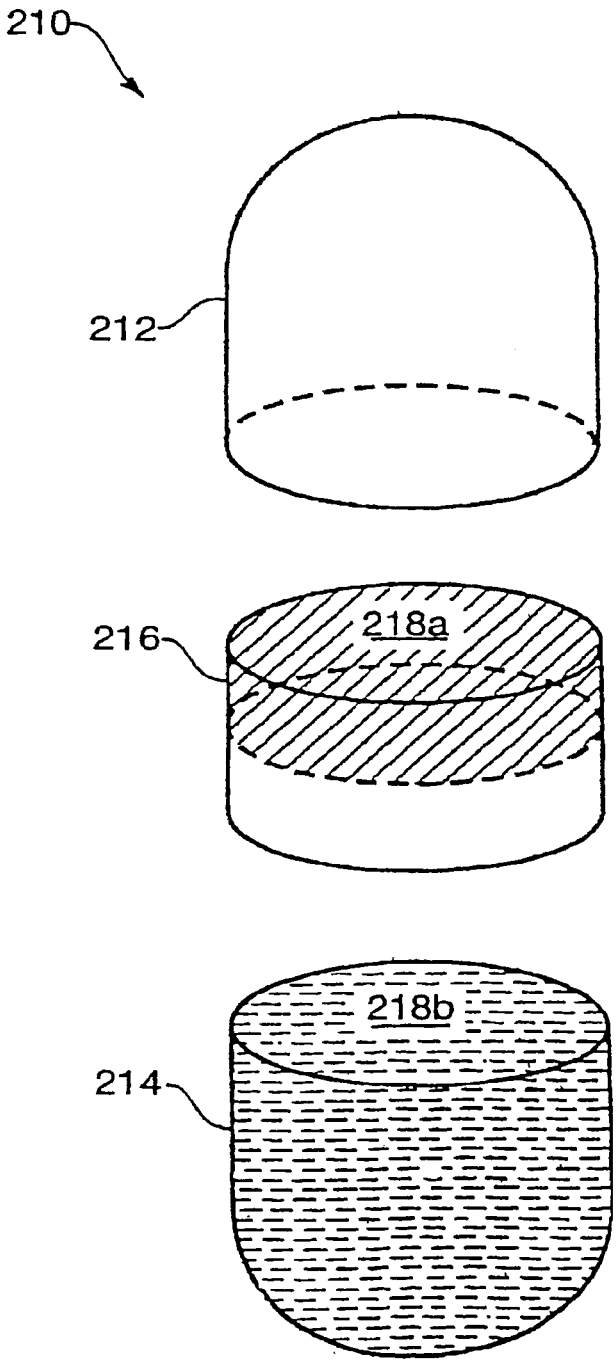


FIG. 3

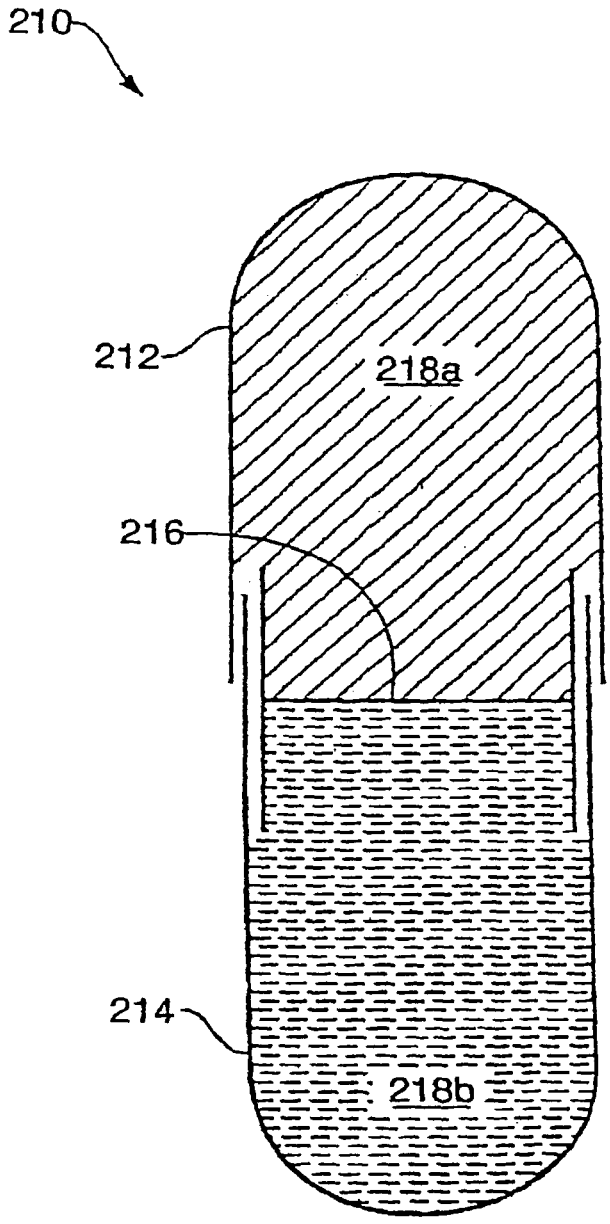


FIG.4

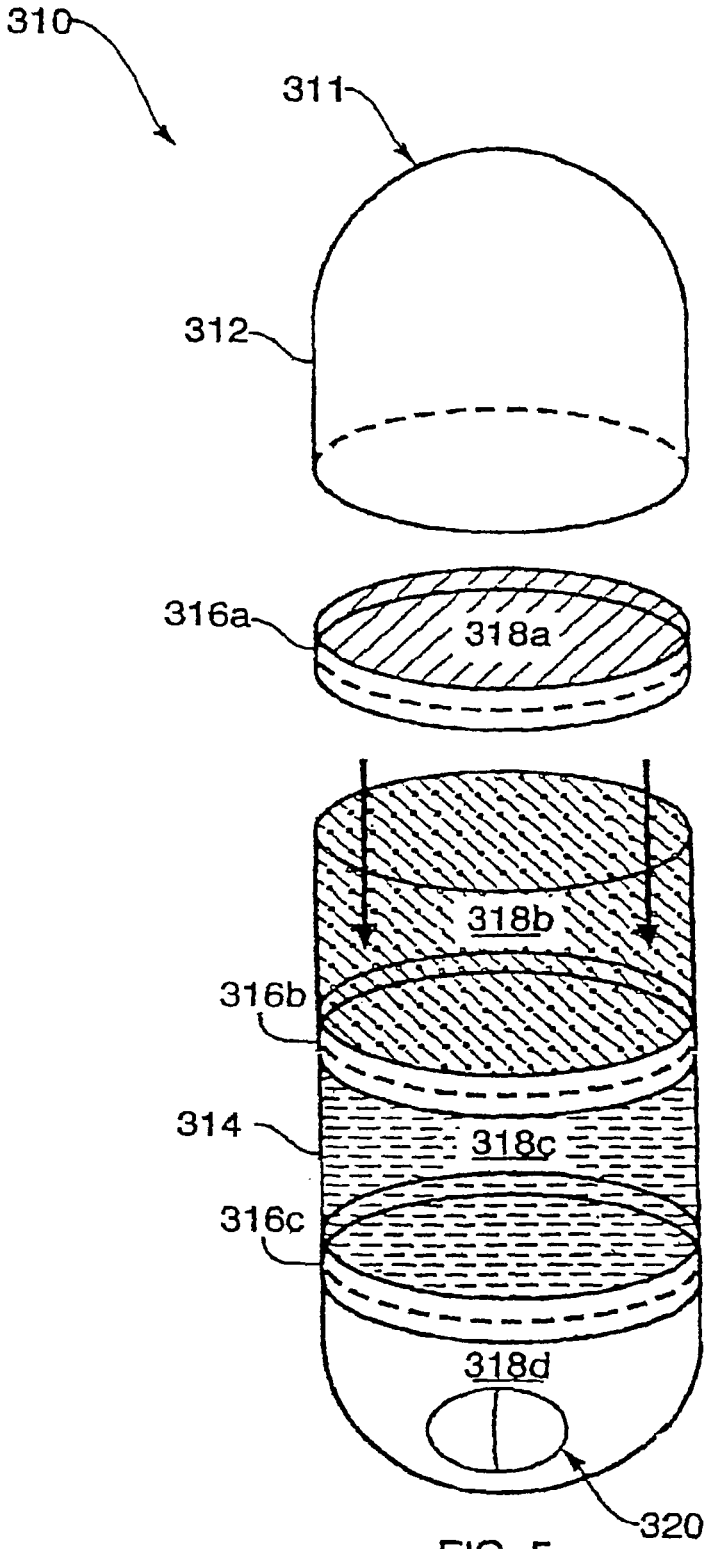


FIG. 5

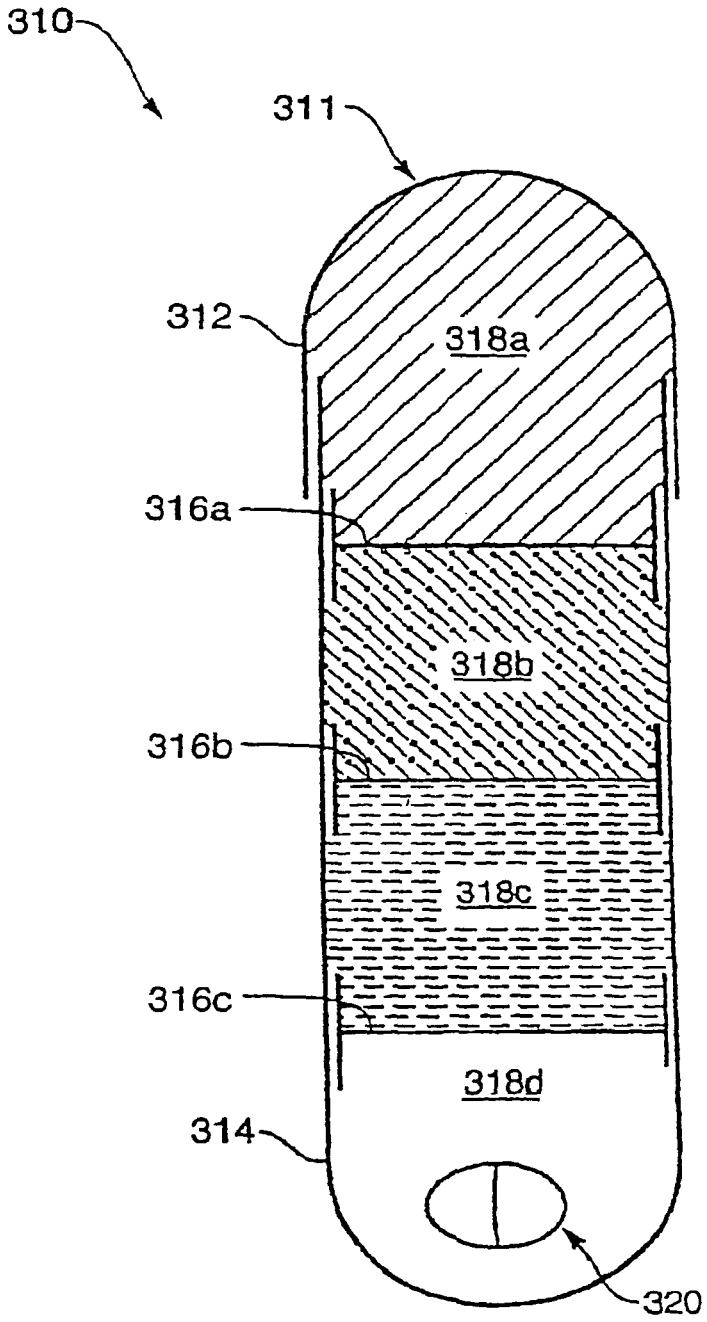


FIG. 6

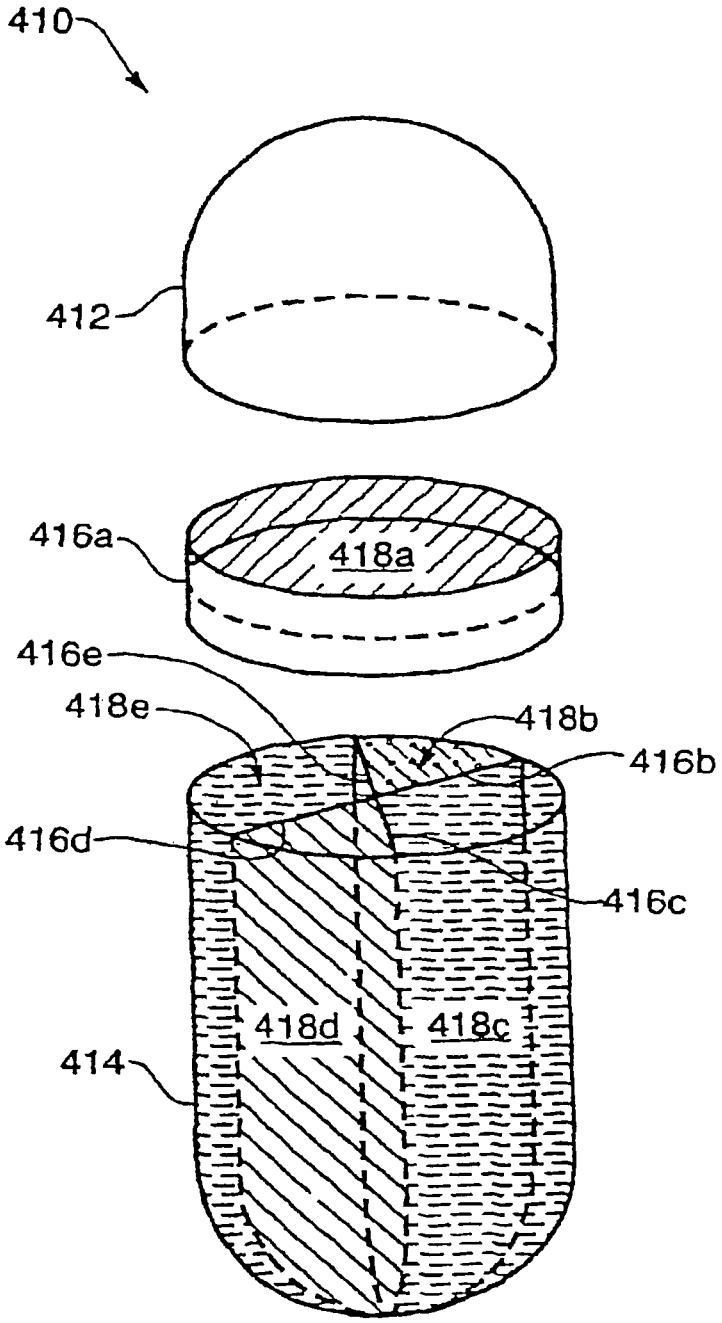


FIG. 7

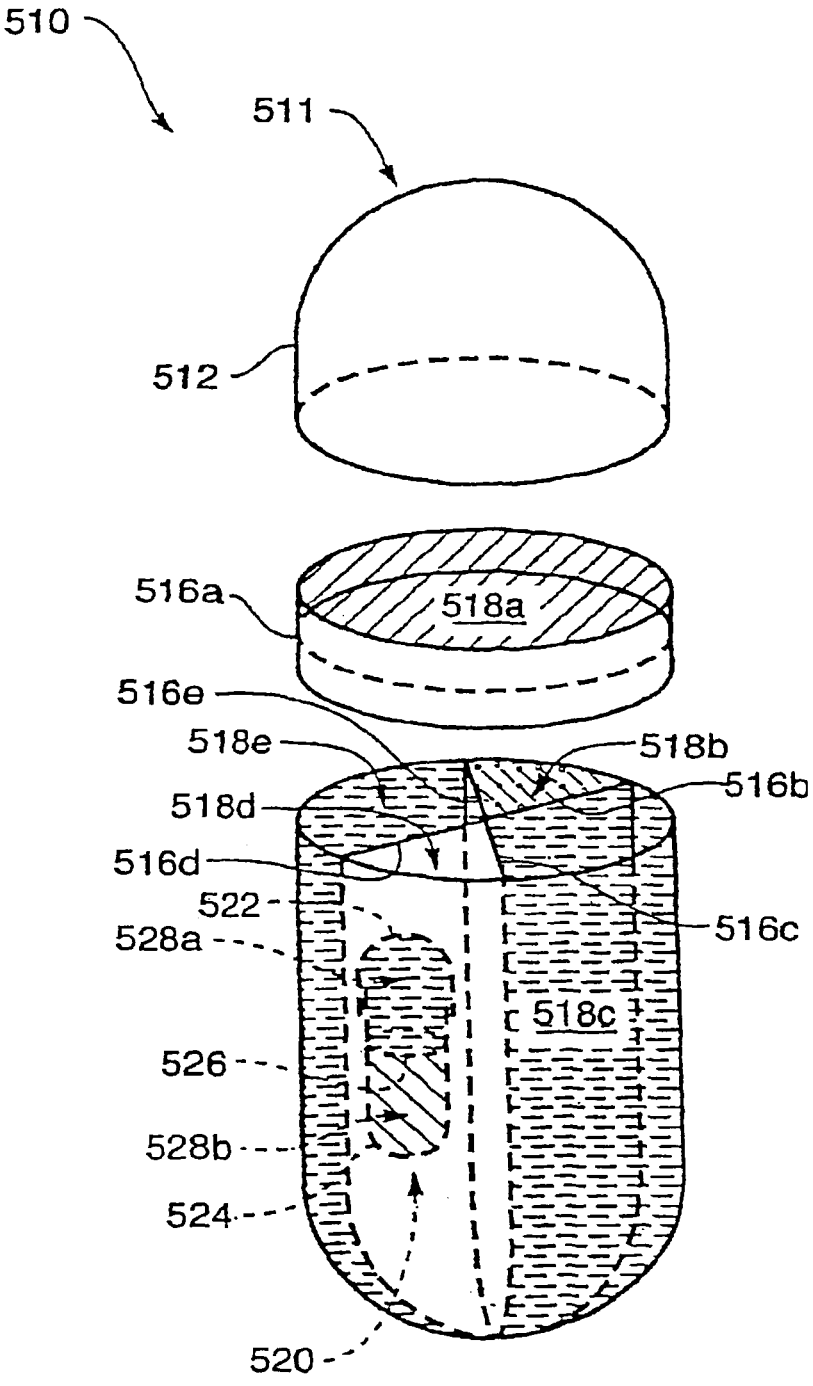

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FIG.8

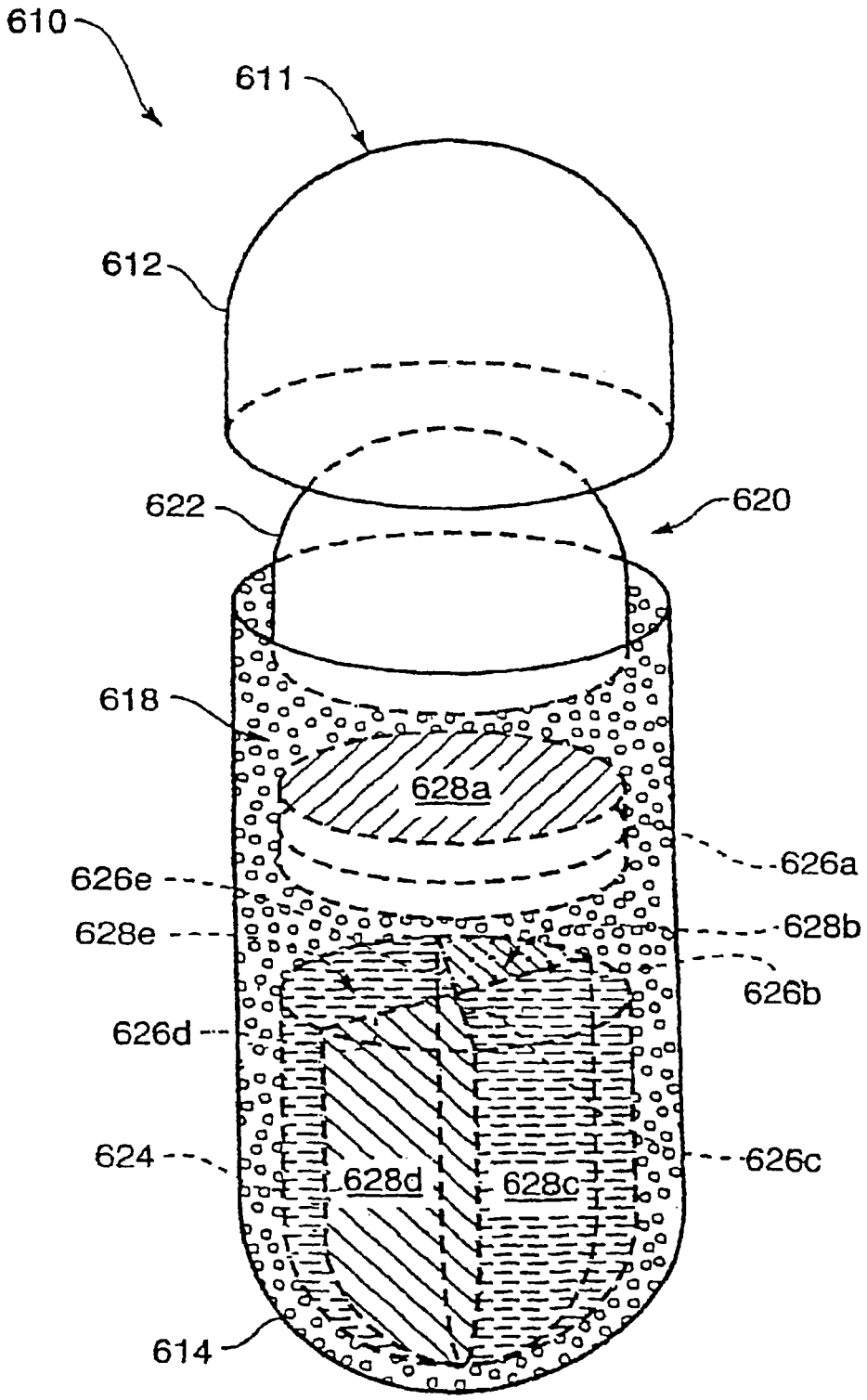
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FIG. 9

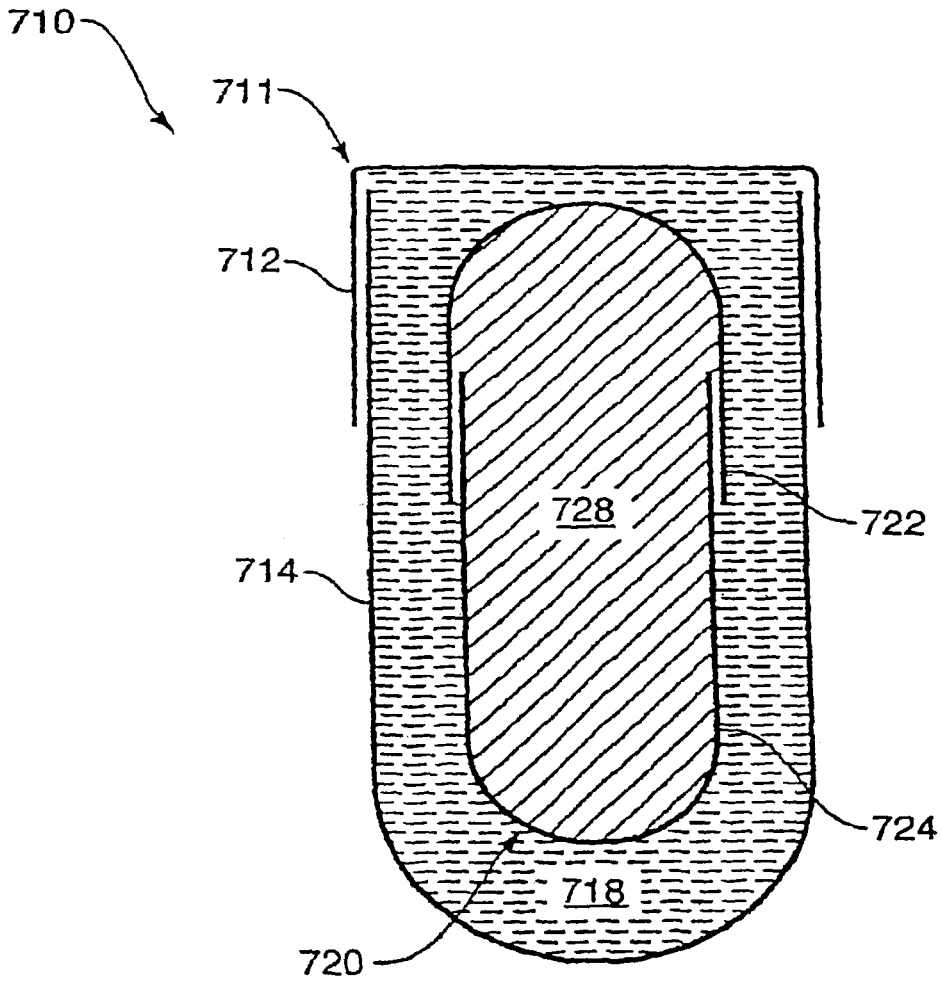

FIG. 10

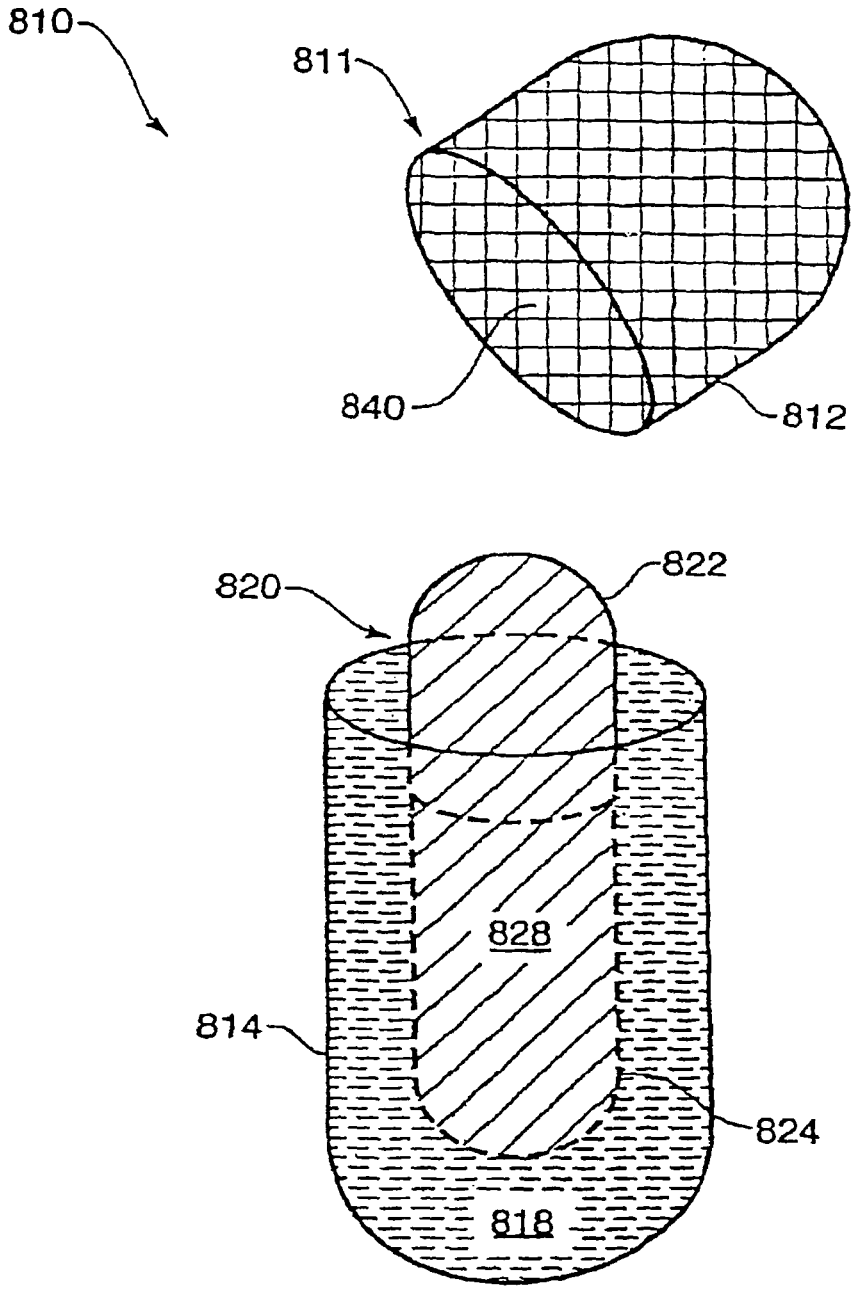

FIG. 11

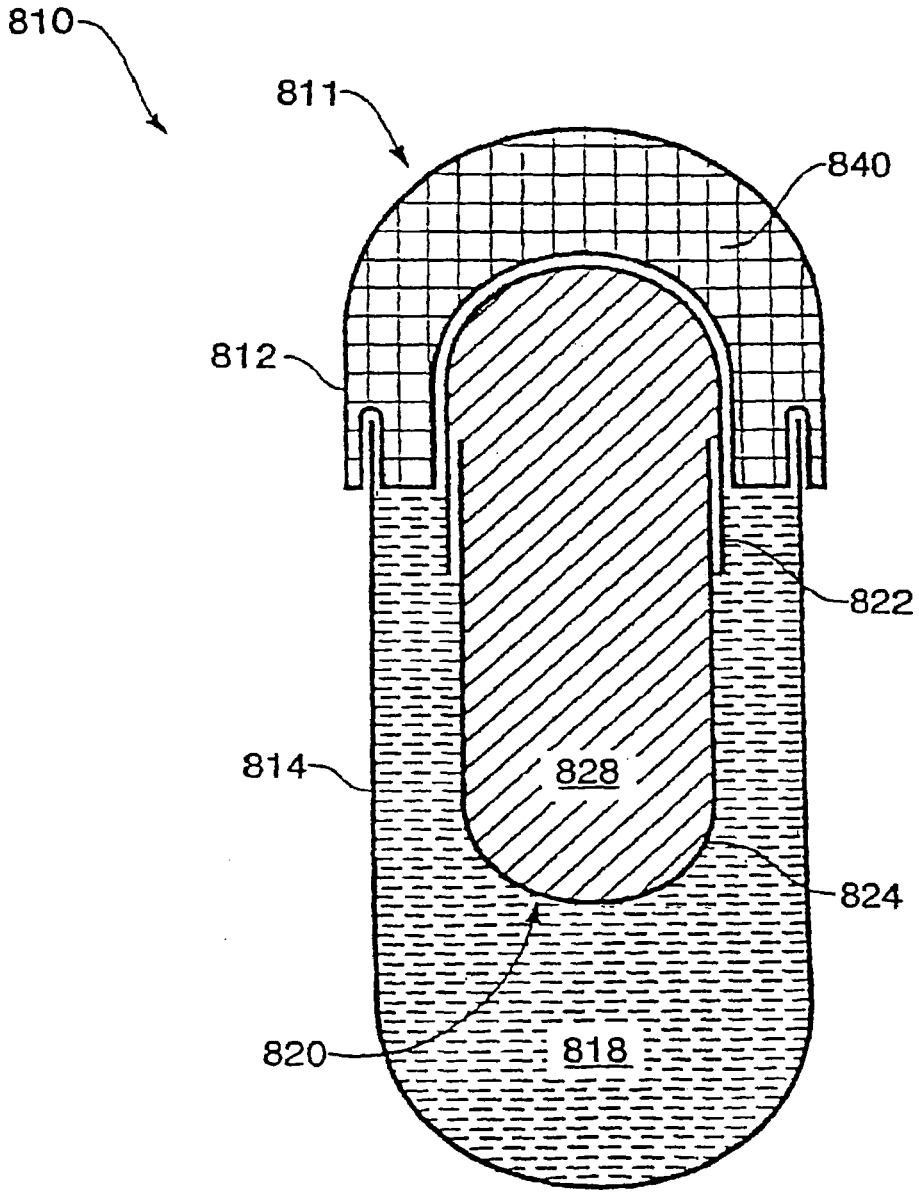

FIG. 12

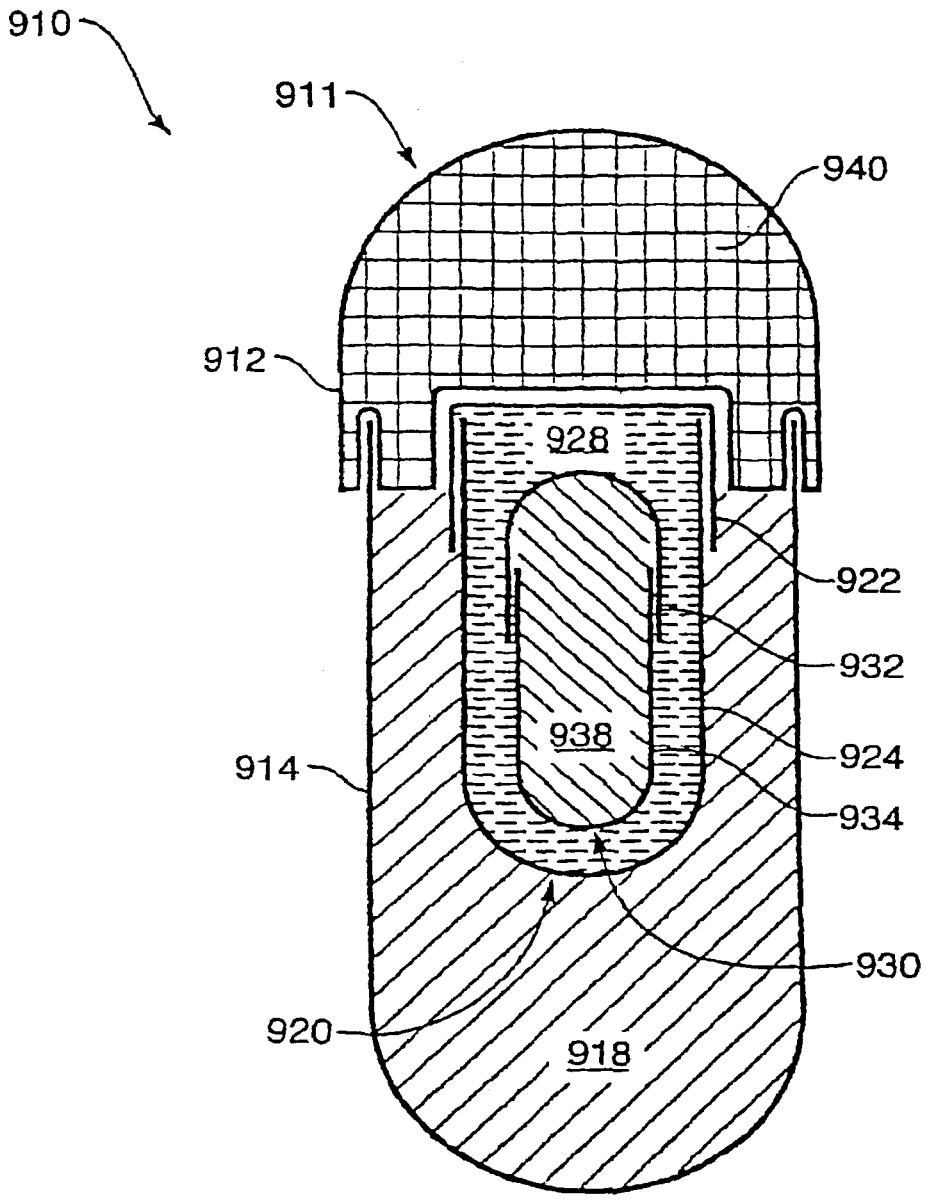

FIG. 13

MULTI-PHASE, MULTI-COMPARTMENT, CAPSULAR DELIVERY APPARATUS AND METHODS FOR USING SAME

RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 10/804,576, filed Mar. 19, 2004, and entitled "MULTI-COMPARTMENT CAPSULAR DELIVERY APPARATUS AND METHODS FOR USING THE SAME", which is a continuation-in-part of PCT/US/03/10816 filed Apr. 9, 2003, and entitled "MULTI-PHASE, MULTI-COMPARTMENT CAPSULAR SYSTEM", the contents of which are hereby incorporated by reference in their entirety. This application incorporates herein by reference U.S. Provisional Application Ser. No. 60/371,448, filed Apr. 10, 2002, and entitled "INTEGRATED CAPSULE DELIVERY APPARATUS AND METHOD." This application further claims the benefit of U.S. application Ser. No. 10/369,427, filed Feb. 18, 2003, entitled "MULTI-PHASE, MULTI-COMPARTMENT CAPSULAR DELIVERY APPARATUS AND METHODS FOR USING SAME," which is hereby incorporated herein by reference. This application further claims the benefit of U.S. application Ser. No. 10/368,951, filed Feb. 18, 2003, entitled "PROCESS FOR ENCAPSULATING MULTI-PHASE, MULTI-COMPARTMENT CAPSULES," which is hereby incorporated herein by reference. This application further claims the benefit of U.S. application Ser. No. 10/369,244, filed on Feb. 18, 2003, and entitled "MULTI-PHASE, MULTI-COMPARTMENT CAPSULAR DELIVERY APPARATUS FOR THERAPEUTIC COMPOSITIONS AND METHODS FOR USING SAME," which is hereby incorporated herein by reference. This application further claims the benefit of U.S. application Ser. No. 10/369,247, filed Feb. 18, 2003, and entitled "PROCESS FOR ENCAPSULATING MULTI-PHASE, MULTI-COMPARTMENT CAPSULES FOR THERAPEUTIC COMPOSITIONS," which is hereby incorporated herein by reference.

BACKGROUND

1. The Field of the Invention

The present invention relates to delivery of active ingredients or medicaments and, more particularly, to novel capsular delivery apparatus and methods for delivering one or more active ingredients or medicaments having diverse physical states (e.g., solid, liquid, gas or dispersion) into a single dosage, multi-compartment capsule.

The present invention further relates to methods for the administration of a plurality of heterogenous chemical and biological compounds to animals and humans using a multi-compartment delivery system for treatment of different conditions or the same condition or diseases (different or same) in one or more organ systems.

2. Background of the Invention

As appreciated by those skilled in the art, the contemplation, design, testing and manufacture of chemicals and biomolecules for administration to humans and animals, as nutritional or therapeutic agents, requires a thorough integration of clinically contemplated delivery principles and modalities. Chemicals and biomolecules that may be administered to humans and animals are often referred to herein as "actives," "active ingredients" or "medicaments."

Oral administration has become one of the most frequent routes for delivering one or more active ingredients or medicaments to the body. Active ingredients or medicaments, such as nutritional or therapeutic agents, may be orally administered in a variety of physical states (i.e., solid, liquid or gas). Tablets and capsules are generally the most common vehicle for the oral delivery of medicaments. As appreciated, a tablet may be broadly characterized as a compressed powder or granular solid. Prior to compression of the granular powder comprising the medicament into tablet form, the presence of one or more excipients may be required. An excipient includes any inert substance (i.e., gum arabic, starch or the like) combined with a principal ingredient to facilitate the preparation of an agreeable or convenient dosage form of the active or medicament. Functional characteristics of excipients may include, for example, disintegration, lubrication, appearance, palatability, shelf-stability or the like.

Those skilled in the art also developed capsules as a contrivance for containing a solid or liquid dosage form of a medicament. Traditional capsular embodiments include a first containment section referred to as a base, and a second containment section referred to as a cap. The two pieces of the capsule are usually formulated and designed in a manner such that the material to be encapsulated may be introduced into the base section, whereas the open end of the cap section may be correspondingly positioned over the open end of the base. The walls of the cap and base are generally in physical contact with one another to form a single internal cavity. A means for structurally sealing the cap in relation to the base may also be incorporated during manufacture to insure non-tampering of the capsule. In this regard, those skilled in the art developed sealing technology which contemplates banding, heat fusion (spot-welding) and snap seals which utilize a "tongue and groove" scheme.

The outer walls of a capsule are preferably formed of a soluble ingredient, such as, for example, gelatin (animal-based product), starch, hydrophillic polymer or hydroxypropyl methyl-cellulose (HPMC), which provides a barrier for containing the active ingredient or medicament, in powder or liquid form, within the internal periphery of the capsule walls. Traditionally, hard gelatin capsules may be manufactured by dipping plates of stainless steel pins into a pool of gelatin solution. The pins are then removed from the gelatin and rotated while the gelatin is dried in a kiln with forced, humidity-controlled air. Once dried, the gelatin capsules are typically stripped from the pins, trimmed to a suitable length and then joined together (e.g. base and cap) and packaged for production use.

With the advent of automated encapsulation machinery, the responsibility to produce encapsulated products shifted mainly to industrial manufacturers. Contemporaneous with the development of the encapsulation industry, those skilled in the art have advanced the state of the encapsulation art. For example, several significant improvements in encapsulation technology have been seen over the last forty years. These technological improvements have included, for example, the development of soft elastic capsules, film-coating techniques, micro-encapsulation and multiple-compartment technology.

Soft elastic capsules, often referred to as soft gelatin capsules, were developed in an effort to provide means for encapsulating liquids and other medicaments which are typically poorly soluble in water. In preferred design, soft elastic capsules are made from a thicker and more plastic gelatin having an increased flexibility due to the addition of a polyol, such as glycerin or sorbitol. The addition of such plasticizers has been found, however, to have the potential disadvantage of increasing the risk for microbial growth. Thus an antimicrobial, such as a paraben or sorbic acid, may be added to the soft elastic capsule shell in order to address any microbial concern.

Prior art film-coating techniques generally involve a plating process, whereby a thin, uniform film may be deposited

onto the outer surface of the of the delivery vehicle (e.g., tablet or capsule). Several successive layers may be deposited onto the outer surface of the vehicle, if desired, in an effort to facilitate various desirable properties. For example, sugar-coating, a precursor to film-coating, has been used by those skilled in the art for more than one hundred years to make tablets more palatable. Other advantages or properties of film-coating may include for example, but not by way of limitation, protection from moisture, oxidation, controlling microbial contamination and inhibiting modification of the chemical properties of the active ingredient. As further appreciated by those skilled in the art, prior art film-coating may form an interfacial barrier between two chemicals or chemical compounds that might otherwise react when they come into contact.

Enteric coatings and sustained-release formulations are contemplated as variations on prior art film-coating techniques. In particular, enteric coating describes a process where the delivery vehicle (e.g., tablet or capsule) is coated with one or more layers of chemicals that are somewhat resistant to extreme pH conditions. For example, conditions of extremely low pH are commonly encounter in the stomach. Many active ingredients or medicaments are in the form of a pharmaceutical salt and thus highly susceptible to ionization in the presence of hydrogen ions. Thus, the presence of an enteric coating generally provides a level of protection as to degradation of the active ingredient or medicament until transit from the stomach into the small intestine is accomplished.

Film coatings have also led to the development of delivery vehicles (e.g., tablets and capsules) having sustained-release properties. Mixtures of waxes, cellulose, silicone and similar resins have been found useful by those skilled in the art for creating-sustained release coatings. In principle, these prior art coatings function to delay the release of the active ingredient or medicament to the targeted body system, thereby facilitating a timed, absorption rate in the body. Furthermore, the entire daily dosage of an active or medicament may be contained in a single, sustained-release delivery vehicle (e.g., tablet or capsule), whereas the immediate absorption of the entire dosage could possibly lead to an overdosage of the medicament. Thus, by layering quanta of medicament with differential coatings, the dosage undergoes a controlled release over specified time period. The application of sustained-release film coating technology therefore may inherently facilitate the delivery of a total daily dosage amount of an active or medicament to be released to the body in controlled increments.

Over the last several years, a considerable amount of attention has been focused on the further development of multi-compartment capsule technology for the delivery of therapeutic and diagnostic agents. Series formulations teach the use of membranes or other types of barriers to cordon a line of separate chambers within a single encapsulating shell. As appreciated, the purpose of such multi-compartment delivery devices is the administration of multiple dosages. Moreover, multiple-compartment delivery mechanisms of the prior art were developed to circumvent or diminish the effects of harsh pH environments within humans. For example, the prior art contemplates a hard capsule formulation which contains three different compartments of active medicaments for administration to the vaginal and rectal areas. In preferred structure, the formulation outer, rapid-release layer may contain an active medicament and excipient; the middle, intermediate-release layer may include a powder form of active medicament; and the inner, slow-release layer may contain pellets or granules of active medicament.

Also taught in the prior art are multi-compartment capsules having groups of spheroids with pH-dependent coatings which are encapsulated within a hard gelatin shell and provided for treating female yeast infection. The first spheroid is preferably uncoated and may be in a powder form; the second spheroid may contain a pH sensitive coat; and the inner spheroid may include a pH insensitive coat.

In addition to pH-sensitive coatings, hydrogels and other gastric retention technologies have been developed by those skilled in the art in an effort to retard the progression of the delivery vehicle during enteric transit. This retarding action, presumably, allows the full amount of active medicament to be released and/or targeted to a specific area of the gastrointestinal tract. Hydrogel and related gastric retention devices of the prior art generally rely upon the imbibing of water into a center core which is filled with cellulose or similar water absorbent material. In preferred operation, the material swells and releases multiple compartments of active medicament. The concept of using bulk size to slow transit of single active medicament in a single physical state is thus appreciated.

In an effort to administer active ingredients or medicaments to a specific location in the body to treat a specific disorder caused by a specific pathogen, those skilled in the art have used targeted-release systems using multi-compartment capsular technology. For example, a method for carrying out a triple therapy against the microorganisms *Helicobacter pylori*, a known infectious agent which is believed largely responsible for the development of gastric ulcer disease, was developed which comprises the steps of oral administration of a pharmaceutical dosage form comprising an internal capsule placed inside an external capsule, wherein the external capsule comprises a soluble salt of bismuth and a first antibiotic, and the internal capsule comprises a second antibiotic. In addition, multi-compartmental capsules were developed which combine, a nutrient supplement with a viable direct-fed microbial (i.e., gastrointestinal microorganisms, including bacteria, live cell yeasts, fungi or a combination thereof) for the purpose of treating livestock for feeding disorders and improving feed efficiency.

A disadvantage with prior art encapsulation technology is when the base and corresponding cap of a capsule are joined, dead space volume is typically created within the internal periphery of the capsule. Internal capsular dead space may be filed with an air bubble which may ultimately react with one or more of the active ingredients or medicaments introduced within the capsule, thereby potentially degrading the quality and effectiveness of the active ingredients.

Although the prior art discloses multiple compartment, capsular delivery technology, these manifestations generally includes one of two approaches. For example, one approach contemplates the introduction of a single active or medicament into multiple capsular compartments to vary the temporal release of the medicament and ultimately the absorption rate into the body. Another approach contemplates the introduction of a plurality of active ingredients or medicaments into different compartments of a single capsule for delivery to a specific area of the body to treat a targeted illness or condition.

The use or contemplation of multiple-compartment capsular delivery apparatus or methods which deliver different physical forms of the same active or medicament, or a variation in physical forms of different actives or medicaments in a single dosage, however, has not heretofore been contemplated in the art. As appreciated by those skilled in the art, active ingredients or medicaments may take the physical form of a solid (e.g., pill, tablet, capsule (both hard and soft elastic),

powder, granulation, flakes, troches (lozenges and pastilles), suppositories and semi-solid ointments, pastes, emulsions and creams), a liquid (e.g., solution, spirits, elixir, syrups, sprays and fluid extracts), a gas or a dispersion. A dispersion is a system in which a dispersed phase is distributed through a continuous phase (e.g., aerosols (liquid or solid in gas), suspensions (solid in liquid), emulsion (liquid in liquid), foam (gas in liquid), solid foam (solid in gas) or gel (liquid or solid in solid)). Dispersions can be classified as molecular, colloidal and coarse, depending on size. In many circumstances, however, the different physical forms or phases of more than one active ingredient or medicament may not be suitably combined or mixed together without altering the individual desirable properties of the active ingredient or medicament. For example, although it would be possible and desirable to formulate a dispersion by combining a first active ingredient in the solid state with a second active ingredient that exists as a liquid, adverse chemical interactions between the active ingredients may adversely affect various characteristics of the ingredients, including but not limited to, their shelf lives. The resulting chemical decomposition—and the potential formation of any unwanted side products—could result in diminished drug potency or even toxicity to a patient.

Additionally, the physical properties of crystalline active ingredients could be drastically altered in scenarios where it is desirable to co-administer a crystalline active ingredient with a liquid or semi-liquid different active ingredient. In this context, the control of physical properties such as active ingredient dissolution rate and solubility is often a critical factor in determining the overall bioavailability of the active ingredient. It is well established in the art that different polymorphs or solvates of the same crystalline active ingredient exhibit dramatically different solubility and dissolution rates. Thus, combining a crystalline active agent with a liquid or semi-liquid active agent could give rise to an equilibrium between concentrations of different polymorphs and/or solvates of the crystalline active ingredient, and thereby frustrate efforts at tailoring an active ingredient mixture to its intended purpose as a medicament.

Another shortcoming with co-administering plural active ingredients in different physical forms in an intimate mixture is the potential for adverse in vivo drug-drug interactions upon administration. The desire to co-administer these active ingredients would be offset by the one active ingredient, for example as in a liquid or semi-liquid (e.g., a paste, solution, or syrup) form, becoming rapidly available. In this context, the active ingredient may adversely react with a co-administered drug, for example a less bioavailable solid or semi-solid, in a physiological environment. Thus, the true therapeutic benefit resulting from the pharmacological effects of the individual active agents may never be realized. It would be desirable to co-administer plural active ingredients while insuring against the potential of such harmful drug-drug interactions.

Providing active ingredients or medicaments in separate capsules may also be undesirable in the context of patient compliance. Geriatric and pediatric populations in particular disfavor the handling and consumption of multiple capsules of active ingredients. Patient compliance is essential in maintaining patient health in many dosage regimens. For example, deviations from accurate dosing and consistent consumption of immunosuppressant therapies can result in severe or even lethal consequences for a patient. Providing combined dosages of active ingredients would result in fewer capsules a patient or consumer would have to take, and thereby contribute to an overall increase in compliance.

Therefore, it would be desirable to provide a multi-compartment capsular delivery apparatus and methods that provide active ingredients or medicaments having diverse physical properties (e.g., solid, liquid, gas or dispersion), which mayor may not be properly combined or stored together into a unitary structure (i.e., multi-compartment capsule) for usage in a single dosage form. The present invention, in overcoming the shortcomings of the prior art, satisfies these and other objectives.

The art and practice of pharmacy can be divided into four distinct divisions. Pharmacology is the study of interactions occurring between the pharmacologic agent, or medicament and specific targeted cells in the body. More specifically, the interaction between an active agent and a cellular receptor along with the resulting change in cell physiology is examined. Medicinal chemistry is largely concerned with the identification of naturally occurring and synthetic compounds which possess medicinal characteristics.

Pharmacotherapeutics is the holistic application of pharmacy practice to specific pathologies, illnesses, and other body functions. Finally, Pharmaceutical science ascertains or regulates the composition of medicinal substances, and is largely directed to the development of new mechanisms for delivering chemicals and biomolecules into animals and humans. A subcategory of pharmaceutical science is called pharmacokinetics and sometimes generally referred to as biopharmaceutics.

A.D.M.E. is an acronym often used to describe the four essential components to pharmaceutical science: absorption, distribution, metabolism, and elimination, respectively. One way to differentiate between pharmacology and pharmaceutical science is that the former is primarily concerned with the effect of the medicament on the body, whereas, the latter is primarily concerned with the delivery and time-course of the medicament on its journey through the body.

In clinical applications, chemicals and biomolecules are often referred to as active ingredients or medicaments. Medicaments may include "pharmaceuticals, nutraceuticals, biotechnicals, vitamins, minerals and dietary supplements." Oral administration is the most frequent route for delivery of medicaments. Medicaments may be orally administered in a variety of physical states, including, solid, liquid, dispersion, and gaseous forms. As appreciated, tablets and capsules are the most common vehicle for oral delivery of medicaments.

Frequently, a medical or surgical patient may receive a plurality of concurrent medicaments. Data has been accumulated to demonstrate that patients undergoing a surgical procedure may receive ten (10) or more medicaments during the surgery and the resulting surgical recovery period. Some patients who have undergone organ transplantation or who have contracted human immunodeficiency virus (HIV) may receive three (3) or more medicaments which require multiple administrations per day. HIV patients often receive many more than three (3) medicaments. These medicaments may be necessary for the treatment of several conditions occurring in a plurality of organ systems or they may be necessary to treat a single condition or some combination thereof.

In some cases, it may be desirous to combine a plurality of medicaments because of a synergistic interaction between a plurality of medicaments. This synergy may enhance the efficacy of one or more of the medicaments. Medicaments may be combined to increase the intensity of response or efficacy. A plurality of medicaments, in combination, may be homergic (i.e., elicit the same quality of effect). In many cases, a plurality of homergic medicaments may also be homo dynamic (i.e., interact with the same receptor). A plurality of homergic medicaments may be additive, supra-additive and infra-additive. A plurality of combined medicaments which do not produce the same quality of response may be called,

heterergic. When heterergy is found to be a positive effect (i.e., at least one medicament enhances the response to another medicament), this may be called synergism and is sometimes called synergy.

In further cases, it maybe desirous to combine a plurality of medicaments to decrease their individual dosages and possibility for toxicity. It may also be desirous to combine a plurality of medicaments to target the treatment of a disease, illness or condition from divergent angles. It may be desirous to combine a plurality of medicaments to minimize the side effects and adverse effects of one or more medicaments. It may be still further desirous to combine a plurality of medicaments to alter the pharmacokinetic characteristics of one or more medicaments. For example, alterations in the absorption, distribution, metabolism or elimination of one or more medicaments.

Fixed combinations of a plurality of medicaments have been generally disfavored due to any number of perceived disadvantages. These disadvantages may include, for example: (1) complicating the interpretation of safety and efficacy in therapeutic regimens, (2) there may be inter-patient differences to fixed combinations, (3) there may be difficulties in dosage titration, and (4) the delivery platforms for fixed combinations have generally been found to be uneconomical to produce.

On the other hand, fixed combinations of a plurality of medicaments may lead to several therapeutic advantages, including, for example, but not by way of limitation: (1) increasing patient compliance with therapy, (2) increasing efficacy by optimizing timing of medicaments, (3) minimization of side effects and adverse effects, (4) enhancement of pharmacokinetic characteristics of one or more medicaments in a fixed combination, (5) increased patient quality of life, (6) optimization of institutional resources by minimizing the amount of medicament administrations, and (7) minimizing patient length of stay in institutional facilities by optimizing therapy.

Prior art therapeutic technologies contain isolated examples of pharmaceutical formulations containing fixed combinations of medicaments. However, therapeutic technologies of the prior art teach a fixed combination, wherein a plurality of medicaments are placed into a single receiving chamber in the delivery formulation (i.e., no separation between the plurality of medicaments).

In view of the state of the technology as it exists today, generally, therapeutic apparatus and methods are needed to provide a plurality of medicaments for medical and surgical conditions, as well as maintenance of normal health function for delivery to animals and humans using a multi-chambered delivery apparatus. Such apparatus and methods for delivering a plurality of medicaments to animals and humans using a multi-chambered delivery apparatus are contemplated herein.

BRIEF SUMMARY AND OBJECTS OF THE INVENTION

In view of the foregoing, it is a primary object of the present invention to provide novel integrated capsule delivery apparatus and methods for delivering diverse physical states (e.g., solid, liquid, gas or dispersion) of a single active ingredient or medicament, or a plurality of active ingredients or medicaments, in a single dosage form, wherein at least two of the active ingredients or medicaments have physical states that differ.

It is also an object of the present invention to provide novel integrated capsule delivery apparatus and methods which facilitate various desirable properties including, for example, controlling time-release of key active ingredients or medicaments, prolonging shelf-fife of the active ingredients or medicaments, improving palatability, reducing overall production costs and, accordingly, reducing the number of capsules consumed by a patient or consumer as nutritional or therapeutic agents.

Further, it is an object of the present invention to provide novel integrated capsule delivery apparatus and methods for delivering one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) in the form of a single dosage, multi-compartment capsule having one or more active ingredients in a primary capsule, and one or more active ingredients introduced into a secondary smaller capsule having a size sufficient for being selectively positionable within the primary capsule, wherein the active ingredient(s) within the primary capsule comprises a physical state (e.g., solid, liquid, gas or dispersion) that is different from the physical state of the active ingredient(s) in the secondary capsule.

It is an additional object of the present invention to provide novel integrated capsule delivery apparatus and methods for delivering one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) in the form of a single dosage, multi-compartment capsule having one or more active ingredients in a primary capsule and the same active ingredient(s) introduced into a smaller secondary capsule having a size sufficient for being positionable within the primary capsule, wherein the active ingredient(s) in the primary capsule comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the active ingredient(s) in the secondary capsule.

It is a further object of the present invention to provide novel integrated capsule delivery apparatus and methods for delivering one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) in the form of a single dosage, multi-compartment capsule wherein at least one of the primary and secondary capsules include a time-release coating for controlling the release of the active ingredient(s) contained therein.

It is also another object of the present invention to provide novel integrated capsule delivery apparatus and methods for delivering one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) in the form of a single dosage, multi-compartment capsule having one or more active ingredients in the capsular body, wherein the capsule includes a longitudinally extending body and at least one dividing wall formed along a length of the extending body to form a first chamber and an opposing second chamber within the capsular body and introducing at least one active ingredient or medicament having a first physical state into the first chamber and at least one active ingredient or medicament having a second physical state into a second chamber, whereas the physical state (e.g., solid, liquid, gas or dispersion) of the ingredient(s) in the first chamber is different from the physical state of the ingredient(s) in the second chamber.

It is an additional object of the present invention to provide novel integrated capsule delivery apparatus and methods for delivering one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) in the form of a single dosage, multi-compartment capsule having a longitudinally extending body and one or more dividing walls

disposed along the length of the longitudinally extending body of the capsule, wherein the capsule and one or more of the dividing walls contained therein may include time-release coatings for controlling the release of the active ingredients or medicaments contained therein, respectively.

It is a further object of the present invention to provide novel integrated capsule delivery apparatus and methods for delivering one or more active ingredients or medicaments (e.g. pharmaeceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) in the form of a single dosage, multi-compartment capsule having a plurality of active ingredients or medicaments having the physical form of a solid (e.g. pill, tablet, capsule (both hard and soft elastic), powder, granulation, flakes, troches (lozenges and pastilles), suppositories and semi-solid ointments, pastes, emulsions and creams), a liquid (e.g., solution, spirits, elixir and fluid extracts), a gas or a dispersion (e.g., aerosols (liquid or solid in gas), suspensions (solid in liquid), emulsion (liquid in liquid), foam (gas in liquid), solid foam (solid in gas) or gel (liquid or solid in solid), wherein the physical form of the active ingredients differ between a primary and secondary capsule, and between one or more dividing walls disposed in spaced-apart relationship along the length of a longitudinally extending capsular body.

It is a still further object of the present invention to provide novel integrated capsule delivery apparatus and methods for delivering one or more active ingredients or medicaments (e.g., pharmaeceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) in the form of a single dosage, multi-compartment capsule, wherein an encapsulation process comprises the steps of: (1) providing a capsule comprising a first end, a second end, a longitudinally extending body having a length disposed between the first and second ends, and a plurality of dividing walls spaced apart along the length of the extending body, wherein the dividing walls form a plurality of receiving chambers; (2) introducing at least one active ingredient having a first physical state into a first receiving chamber; (3) introducing at least one active ingredient having a second physical state into a second receiving chamber; (4) introducing at least one active ingredient having a third physical state into a third receiving chamber, wherein the physical states of at least two of the active ingredients introduced into the first, second or third receiving chambers differ; and (5) sealing the first and second ends of said capsule.

Additionally, it is an object of the present invention to provide novel integrated capsule delivery apparatus and methods for delivering a single dosage, multi-compartment capsule comprising a capsular base and cap configuration, wherein the size and shape of the cap, relative to its sealing relationship with the base, generally eliminates or substantially reduces any potential dead space volume within the internal periphery of the capsule, thereby functionally negating the opportunity for reaction between an air bubble and one or more active ingredients introduced into the capsule and, accordingly, improving stability of the capsular ingredient(s).

Consistent with the foregoing objects, and in accordance with the invention as embodied and broadly described herein, one presently preferred embodiment of the novel integrated capsule delivery apparatus and methods of the present invention comprises a multi-compartment capsule including a primary capsule and a secondary capsule selectively positionable within an internal periphery of the primary capsule. The secondary capsule may include a base, a corresponding cap and one or more receiving chambers. Each of the receiving chambers of the secondary capsule may be formed having an internal periphery sufficient for receiving at least one active ingredient or medicament (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein. Similarly, the primary capsule may be formed having a base, a corresponding cap and one or more receiving chambers. The receiving chambers of the primary capsule may be formed having an internal periphery sufficient for receiving the secondary capsule and one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) having a physical state (i.e., solid, liquid, gas or dispersion) different from the physical state of the active ingredient(s) housed within the receiving chamber of the secondary capsule.

As further contemplated herein, a multi-compartment capsule is provided comprising a base, a corresponding cap and one or more dividing walls positionable between the base and the cap. Structurally, the size, shape and positioning of the dividing walls relative to the base and corresponding cap facilitates the formation of at least two, independent and separate receiving chambers. Each of the receiving chambers having an internal periphery sufficient for receiving one or more active ingredients or medicaments (e.g. pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein. In preferred design, the physical state (e.g., solid, liquid, gas or dispersion) of the active ingredient(s) in the first receiving chamber is different from the physical state of the active ingredient(s) in the second receiving chamber. After introducing one or more active ingredients or medicaments into each receiving chamber, the cap may be selectively positioned in sealing relationship with the base to form one presently preferred embodiment of the single, dosage multi-compartment capsule.

One presently preferred embodiment of an encapsulation process for forming a multi-compartment capsule may comprise the steps of: (1) providing a primary capsule having a base, a corresponding cap and a receiving chamber; (2) providing a secondary capsule having a base, a corresponding cap and a receiving chamber; (3) introducing at least one ingredient or medicament (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) having a first physical state (e.g., solid, liquid, gas or dispersion) into at least a portion of the receiving chamber of the secondary capsule and selectively positioning the cap in sealing relationship with the base; (4) introducing at least one ingredient or medicament (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) having a second physical state (e.g., solid, liquid, gas or dispersion) into at least a portion of the receiving chamber of the primary capsule, wherein the first physical state of the ingredient(s) in the secondary capsule is different from the second physical state of the ingredient(s) in the primary capsule; and (5) introducing the secondary capsule into at least a portion of the receiving chamber of the primary capsule and selectively positioning the cap in sealing relationship with the base to form a single dosage multi-compartment capsule.

In alternate presently preferred embodiments of the present invention, a tertiary capsule comprising a base, a corresponding cap and a receiving chamber having an internal periphery sufficient for receiving one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) may be selectively introduced within an internal periphery of at least one receiving chamber of the secondary capsule. After the introduction of at least one active ingredient into one or more receiving chambers of a tertiary capsule pursuant to an encapsulation process of the present invention,

the cap of the tertiary capsule may be selectively positioned in sealing relationship with the base and then introduced into at least a portion of the internal periphery of the secondary capsule, together with one or more active ingredients therein. It is contemplated herein that at least two of the active ingredients introduced within the receiving chambers of the primary, secondary and tertiary capsules, respectively, comprise at least two different physical states (e.g., solid, liquid, gas or dispersion).

In preferred structural design, the primary capsule may comprise a cap having a generally U-shaped configuration adapted to provide a sealing relationship when engaging the corresponding base, thereby reducing dead space volume in the internal periphery of the cap and receiving chamber of the base. A cap having a configuration adapted to generally eliminate or substantially reduce potential dead space volume of the cap and receiving chamber of the base may, accordingly, function—to negate the potential for a reaction between an air bubble and one or more active ingredient(s) introduced into the base of the primary capsule.

Alternatively, a multi-compartment capsule of the present invention may include the introduction of a filling material into the cap of the primary capsule, the cap having a general cylindrical configuration adapted to provide a sealing relationship when engaging the corresponding base. An amount of filling material may be introduced into at least a portion of the internal periphery of the cap to fill, either partially or completely, the inner volume of the cap, thereby reducing the dead space volume in the cap and the internal periphery of the receiving chamber of the base. In this regard, the introduction of a filling material relative to the internal periphery of the cap may generally eliminate or substantially reduce the potential dead space volume, thus functionally negating the potential for a reaction between an air bubble and one or more active ingredient(s) introduced into the base of the primary capsule.

The primary, secondary or tertiary capsules, in accordance with the present invention, may be formed having the same or different colors. Moreover, the base and corresponding cap of a single capsule may be formed having different colors in an effort to enhance the aesthetics of the capsule to the consumer. In one presently preferred embodiment of a multi-compartment capsule of the present invention, the dosage may be banded, sealed or easily dividable in a contact area of the primary and secondary capsules or the sealing band may be color-coded to assist in branding, if desired.

It is further contemplated herein that a multi-compartment capsule of the present invention may comprise component parts of the capsule having various time-release coatings to facilitate the release and ultimately the absorption of those active ingredients introduced into the different receiving chambers of the multi-compartment capsule to release at different release rates. In particular, a primary capsule may be formed having a conventional time-release coating that dissolves and releases the active ingredient(s) contained therein before the timed-release of the active ingredient(s) contained within a secondary capsule. Likewise, the dividing walls disposed within the internal periphery of the base of a capsule may be formed having conventional time-release coatings that dissolve and release the active ingredients within each receiving chamber defined by the dividing walls at different rates, thereby delivering the active ingredients or medicaments contained within a multi-compartment capsule at different rates. Certain active ingredients or medicaments may, therefore, be delivered at a selected interval, while other ingredients may be released at a later interval. In this way, the novel design of the multi-compartment capsules of the present invention may facilitate precision delivery of active ingredients to targeted areas of the consumer.

Still further, a primary object of the present invention is to provide novel delivery apparatus and methods for affecting multiple organ systems in animals or humans using a plurality of medicaments delivered by a pharmaceutical formulation comprising a multi-chambered apparatus. Accordingly, the present invention provides novel delivery apparatus and administration techniques or methods aimed at affecting multiple organ systems in an animal or human using a plurality of medicaments. A delivery apparatus may be in any multi-chambered apparatus, but preferably in a capsular formulation. Thus, a plurality of medicaments may be encapsulated and stored separately within a larger capsule until the time of ingestion, consumption, or the like. Upon consumption, the capsule walls of one or more dividing walls of a capsule may dissolve to release their contents. Different methods of encapsulation may be used to deliver their respective contents, including but not limited to, dissolution, melting, ablation or biodegradation of the encapsulating wall. In certain embodiments and as contemplated herein, the medicaments retained in the multicompartment capsule may actually diffuse through one or more of the encapsulating walls.

In one embodiment of the present invention there is a multi-compartment capsule, comprising a first receiving chamber comprising at least one ingredient having a first physical state, wherein said ingredient is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral; and a second receiving chamber comprising at least one ingredient having a second physical state, wherein said ingredient is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral; said first physical state of said ingredient of said first receiving chamber being different from said second physical state of said ingredient of said second receiving chamber.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, further comprising a base and a corresponding cap, wherein said cap is configured to provide a sealing relationship when engaging said base.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said cap comprises a configuration adapted to reduce dead volume space within said first receiving chamber.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, further comprising a filling material introduced into said cap to reduce dead volume space within said first receiving chamber.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said filling material is selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gun, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose, oleoresin, polyvinylacetate-phtalate, polymerisates of acrylic or methacrylic esters and combinations thereof.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said first receiving chamber comprises no dead volume space.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said physical state of said ingredient in said first receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said physical state of said ingredient in said second receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said solid is selected from the group consisting of a pill, a tablet, a capsule, a powder, granulation, flakes, a troche, a suppository, an ointment, a paste, an emulsion and a cream.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said liquid is selected from the group consisting of a solution, a spirit, an elixir, a spray, a syrup and a fluid extract.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said dispersion is selected from the group consisting of an aerosol, a suspension, an emulsion, a foam, a solid foam and a gel.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said first receiving chamber comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said second receiving chamber comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said time-release coating of said second receiving chamber is different from said time-release coating of said primary capsule.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, further comprising a third receiving chamber comprising at least one ingredient.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said third receiving chamber is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said third receiving chamber comprises a physical state selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said third receiving chamber comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule, comprising a primary capsule comprising at least one ingredient having a first physical state, wherein said ingredient is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral; a secondary capsule comprising at least one ingredient having a second physical state, wherein said ingredient is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral; said first physical state of said ingredient of said primary capsule being different from said second physical state of said ingredient of said secondary capsule; and said primary capsule comprising an internal periphery sufficient for receiving said ingredient and said secondary capsule therein.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary capsule further comprises a base and a corresponding cap, wherein said cap is configured to provide a sealing relationship when engaging said base.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary capsule comprises no dead volume space.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said first physical state of said ingredient in said primary capsule is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said second physical state of said ingredient in said secondary capsule is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary capsule comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said secondary capsule comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said time-release coating of said secondary capsule is different from said time-release coating of said primary capsule.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said third receiving chamber comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary capsule is formed of a material selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, oleoresin, polyvinylacetate, hydroxypropyl methyl cellulose, polymerisates of acrylic or methacrylic esters, polyvinylacetate-phtalate and combinations thereof.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary capsule further comprises a soft elastic capsule formed of a material selected from the group consisting of glycerin and sorbitol.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said soft elastic capsule includes an antimicrobial selected from the group consisting of paraben and sorbic acid.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said secondary capsule is formed of a material selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, oleoresin, polyvinylacetate, hydroxypropyl methyl cellulose, polymerisates of acrylic or methacrylic esters, polyvinylacetate-phtalate and combinations thereof.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient introduced in said primary capsule comprises a moisture content in the range of about 0% to 6% by weight.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient introduced in said secondary capsule comprises a moisture content in the range of about 0% to 6% by weight.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary and secondary capsules contain at least one pharmaceutically acceptable lubricant in the range of about 0% to 1.0% by weight.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said

lubricant is selected from the group consisting of aluminium-stearate, calciumstearate, magnesiumstearate, tinstearate, talc, sodium lauryl sulfate, lecithins, mineral oils, stearic acid, silicones and mixtures thereof.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary and secondary capsules have different colors.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary capsule is formed having a first color.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said secondary capsule is formed having a second color different from said first color of said primary capsule.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said capsule further comprises a base and a corresponding cap, wherein said cap is configured to provide a sealing relationship when engaging said base.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said base and said cap are formed having different colors.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said sealing relationship between said base and corresponding cap comprises no dead volume space.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said physical state of said ingredient in said first receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said physical state of said ingredient in said second receiving chamber capsule is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said capsule comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said dividing wall comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said time-release coating of said dividing wall is different from said time-release coating of said capsule.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said third receiving chamber comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said capsule is formed of a material selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, oleoresin, polyvinylacetate, hydroxypropyl methyl cellulose, polymerisates of acrylic or methacrylic esters, polyvinylacetate-phtalate and combinations thereof.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said capsule further comprises a soft elastic capsule formed of a material selected from the group consisting of glycerin and sorbitol.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said dividing wall is formed of a material selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, oleoresin, polyvinylacetate, hydroxypropyl methyl cellulose, polymerisates of acrylic or methacrylic esters, polyvinylacetate-phtalate and combinations thereof.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient introduced in said first receiving chamber comprises a moisture content in the range of about 0% to 6% by weight.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient introduced in said second receiving chamber comprises a moisture content in the range of about 0% to 6% by weight.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said capsule contains at least one pharmaceutically acceptable lubricant in the range of about 0% to 10% by weight.

In another embodiment of the present invention there is, an encapsulation process for forming a multi-compartment capsule, said process comprising the steps of providing a primary capsule having a base and a cap; providing a secondary capsule having a base and a cap; introducing at least one ingredient having a first physical state into said secondary capsule, wherein said ingredient introduced into said primary, capsule is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral; positioning said cap of said secondary capsule in sealing relationship with said base; introducing at least one ingredient having a second physical state into said primary capsule, wherein said ingredient introduced into said primary capsule is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral; and wherein said first physical state of said ingredient of said secondary capsule is different from said second physical state of said ingredient of said primary capsule; introducing said secondary capsule into said base of said primary capsule; and positioning said cap of said primary capsule in sealing relationship with said base.

In another embodiment of the present invention there is, an encapsulation process as defined above, further comprising the step of reducing dead volume space within said primary capsule.

In another embodiment of the present invention, an encapsulation process as defined above, further comprising the step of introducing a filling material into said cap of said primary capsule to reduce dead volume space.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said filling material is selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose, oleoresin, polyvinylacetate-phtalate, polymerisates of acrylic or methacrylic esters and combinations thereof.

In another embodiment of the present invention, an encapsulation process as defined above, wherein said cap of said primary capsule comprises a configuration sufficient for reducing dead volume space within the primary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said physical state of said ingredient in said primary capsule is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said physical state of said ingredient in said secondary capsule is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient introduced into said primary capsule is the same as said ingredient introduced into said secondary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said primary capsule comprises a time-release coating.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said secondary capsule comprises a time-release coating.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said time-release coating of said secondary capsule is different from said time-release coating of said primary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the steps of providing a tertiary capsule having a base and a cap; introducing at least one ingredient having a third physical state into said tertiary capsule; positioning said cap of said secondary capsule in sealing relationship with said base; and introducing said tertiary capsule into said base of said secondary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said tertiary capsule is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said tertiary capsule comprises a physical state selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said tertiary capsule comprises a time-release coating.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said primary capsule is formed of a material selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose, oleoresin, polymerisates of acrylic or methacrylic esters, polyvinylacetate-phtalate and combinations thereof.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said primary capsule further comprises—a soft elastic capsule formed of a material selected from the group consisting of glycerin and sorbitol.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said secondary capsule is formed of a material selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose, oleoresin, polymerisates of acrylic or methacrylic esters, polyvinylacetate-phtalate and combinations thereof.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said secondary capsule further comprises a soft elastic capsule formed of a material selected from the group consisting of glycerin and sorbitol.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient introduced in said primary capsule comprises a moisture content in the range of about 0% to 6% by weight.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient introduced in said secondary capsule comprises a moisture content in the range of about 0% to 6% by weight.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said primary and secondary capsules contain at least one pharmaceutically acceptable lubricant in the range of about 0% to 10% by weight.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said lubricant is selected from the group consisting of aluminiumstearate, calciumstearate, magnesiumstearate, tinstearate, talc, sodium lauryl sulfate, lecithins, mineral oils, stearic acid, silicones and combinations thereof.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said primary and secondary capsules are formed having different colors.

In another embodiment of the present invention, there is an encapsulation process for forming a multi-compartment capsule, said process comprising the steps of providing a capsule comprising a cap, a base configured having a longitudinally extending body including a length and at least one dividing wall formed along said length of said extending body, said dividing wall adapted to form a first receiving chamber and a second receiving chamber; introducing at least one ingredient having a first physical state into said second receiving chamber, wherein said ingredient introduced into said primary capsule is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral; introducing at least one ingredient having a second physical state into said first receiving chamber, wherein said ingredient introduced into said primary capsule is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral, and wherein said first physical state of said ingredient of said second receiving chamber being different from said second physical state of said ingredient of said first receiving chamber; and positioning said cap in sealing relationship with said base.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the step of reducing dead volume space within said primary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the step of introducing a filling material into said cap to reduce said dead volume space.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said filling material is selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose, oleoresin, polyvinylacetate-phtalate, polymerisates of acrylic or methacrylic esters and combinations thereof.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said cap comprises a configuration sufficient for reducing dead volume space within said capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said physical state of said ingredient in said receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said physical state of said ingredient in said second receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said first receiving chamber comprises a time-release coating.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said second receiving chamber comprises a time-release coating.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said time-release coating of said second receiving chamber is different from said time-release coating of said first receiving chamber.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the steps of positioning a second dividing wall along said length of said extending body, said second dividing wall adapted to form a third receiving chamber; and introducing at least one ingredient having a third physical state into said third receiving chamber.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said third receiving chamber is selected from the group consisting of a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said third receiving chamber comprises a physical state selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said dispersion is selected from the group consisting of an aerosol, a suspension, an emulsion, a foam, a solid foam and a gel.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said third receiving chamber comprises a time-release coating.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said capsule is formed of a material selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose, oleoresin, polymerisates of acrylic or methacrylic esters, polyvinylacetate-phtalate and combinations thereof.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said capsule further comprises a soft elastic capsule formed of a material selected from the group consisting of glycerin and sorbitol.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said primary and secondary capsules contain at least one pharmaceutically acceptable lubricant in the range of about 0% to 10% by weight.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said lubricant is selected from the group consisting of aluminiumstearate, calciumstearate, magnesiumstearate, tinstearate, talc, sodium lauryl sulfate, lecithins, mineral oils, stearic acid, silicones and combinations thereof.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said base and said cap of said capsule are formed having different colors.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the step of introducing two or more dividing walls adapted to form a plurality of receiving chambers into said base of said capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the step of introducing a capsule into one of said plurality of receiving chambers.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said capsule may comprise a multi-compartment capsule.

In another embodiment of the present invention, there is a multi-compartment capsule, comprising a first receiving chamber comprising at least one ingredient having a first physical state; and a second receiving chamber comprising at least one ingredient having a second physical state, wherein said first physical state of said ingredient of said first receiving chamber being different from said second physical state of said ingredient of said second receiving chamber.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said first receiving chamber comprises no dead space.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said cap is configured to reduce dead volume space within said first receiving chamber.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, further comprising a filling material introduced into said cap to reduce dead volume space within said first receiving chamber.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said first receiving chamber is selected from the group consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said second receiving chamber is selected from the group consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said first receiving chamber comprises a pharmaceutical and said ingredient in said second receiving chamber comprises a pharmaceutical.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said first receiving chamber comprises a pharmaceutical and said ingredient in said second receiving chamber is selected from the group consisting of a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said physical state of said ingredient in said first receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said

physical state of said ingredient in said second receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said time-release coating of said second receiving chamber is different from said time-release coating of said primary capsule.

In another embodiment of the present invention, there is a multi-compartment capsule, comprising a primary capsule comprising at least one ingredient having a first physical state; a secondary capsule comprising at least one ingredient having a second physical state; said first physical state of said ingredient of said primary capsule being different from said second physical state of said ingredient of said secondary capsule; and said primary capsule comprising an internal periphery sufficient for receiving said ingredient and said secondary capsule therein.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary, capsule further comprises a base and a corresponding cap, wherein said cap is configured to provide a sealing relationship when engaging said base.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary capsule comprises no dead volume space.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said primary capsule is selected from the group consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said secondary capsule is selected from the group consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said first receiving chamber comprises a pharmaceutical and said ingredient in said second receiving chamber comprises a pharmaceutical.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient introduced in said primary capsule comprises a moisture content in the range of about 0% to 6% by weight.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient introduced in said secondary capsule comprises a moisture content in the range of about 0% to 6% by weight.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary and secondary capsules contain at least one pharmaceutically acceptable lubricant in the range of about 0% to 10% by weight.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said lubricant is selected from the group consisting of aluminium-stearate, calciumstearate, magnesiumstearate, tinstearate, talc, sodium lauryl sulfate, lecithins, mineral oils, stearic acid, silicones and mixtures thereof.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary and secondary capsules have different colors.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said primary capsule is formed having a first color.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said secondary capsule is formed having a second color different from said first color of said primary capsule.

In another embodiment of the present invention, there is a multi-compartment capsule, comprising a capsule comprising a longitudinally extending body having a length; at least one dividing wall formed along said length of said extending body, said dividing wall forming a first receiving chamber and a second receiving chamber; said first receiving chamber comprising at least one ingredient having a first physical state; said second receiving chamber comprising at least one ingredient having a second physical state; and said first physical state of said ingredient of said first receiving chamber being different from said second physical state of said ingredient of said second receiving chamber.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said capsule further comprises a base and a corresponding cap, wherein said cap is configured to provide a sealing relationship when engaging said base.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said base and said cap are formed having different colors.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said sealing relationship between said base and corresponding cap comprises no dead volume space within said capsule.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said first receiving chamber comprises a pharmaceutical and said ingredient in said second receiving chamber comprises a pharmaceutical.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said ingredient in said first receiving chamber comprises a pharmaceutical and said ingredient in said second receiving chamber is selected from the group consisting of a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said first physical state of said ingredient in said first receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said second physical state of said ingredient in said second receiving chamber capsule is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said capsule comprises a time-release coating.

In another embodiment of the present invention, there is a multi-compartment capsule as defined in above, wherein said capsule is formed of a material selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose, oleoresin, polymerisates of acrylic or methacrylic esters, polyvinylacetate-phtalate and mixtures thereof.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said capsule further comprises a soft elastic capsule formed of a material selected from the group consisting of glycerin and sorbitol.

In another embodiment of the present invention, there is a multi-compartment capsule as defined above, wherein said lubricant is selected from the group consisting of aluminiun-

stearate, calciumstearate, magnesiumnstearate, tinstearate, talc, sodium lauryl sulfate, lecithins, mineral oils, stearic acid, silicones and mixtures thereof.

In another embodiment of the present invention, there is an encapsulation process for forming a multi-compartment capsule, said process comprising the steps of providing a primary capsule having a base and a cap; providing a secondary capsule having a base and a cap; introducing at least one ingredient having a first physical state into said secondary capsule; positioning said cap of said secondary capsule in sealing relationship with said base; introducing at least one ingredient having a second physical state into said primary capsule, wherein said first physical state of said ingredient of said secondary capsule is different from said second physical state of said ingredient of said primary capsule; introducing said secondary capsule into said base of said primary capsule; and positioning said cap of said primary capsule in sealing relationship with said base.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the step of reducing dead volume space within said primary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the step of introducing a filling material into said cap of said primary capsule to reduce dead volume space.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said cap of said primary capsule comprises a configuration sufficient for reducing dead volume space within the primary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient introduced into said primary capsule is selected from the group consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said physical state of said ingredient in said primary capsule is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said secondary capsule is selected from the group consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said physical state of said ingredient in said secondary capsule is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said primary capsule comprises a pharmaceutical and said ingredient in said secondary capsule is selected from the group consisting of a pharmaceutical.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said primary capsule comprises a pharmaceutical and said ingredient in said secondary capsule is selected from the group consisting of a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient introduced into said primary capsule is the same as said ingredient introduced into said secondary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said time-release coating of said secondary capsule is different from said time-release coating of said primary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the steps of providing a tertiary capsule having a base and a cap; introducing at least one ingredient having a third physical state into said tertiary, capsule; positioning said cap of said secondary capsule in sealing relationship with said base; and introducing said tertiary capsule into said base of said secondary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said tertiary capsule is selected from the group consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said tertiary capsule comprises a physical state selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said tertiary capsule comprises a time-release coating.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said lubricant is selected from the group consisting of aluminumstearate, calciumstearate, magnesiumstearate, tinstearate, talc, sodium lauryl sulfate, lecithins, mineral oils, stearic acid, silicones and combinations thereof.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said primary and secondary capsules are formed having different colors.

In another embodiment of the present invention, there is an encapsulation process for forming a multi-compartment capsule, said process comprising the steps of providing a capsule comprising a cap, a base configured having a longitudinally extending body including a length and at least one dividing wall formed along said length of said extending body, said dividing wall adapted to form a first receiving chamber and a second receiving chamber; introducing at least one ingredient having a first physical state into said second receiving chamber; introducing at least one ingredient having a second physical state into said first receiving chamber, wherein said first physical state of said ingredient of said second receiving chamber being different from said second physical state of said ingredient of said first receiving chamber; and positioning said cap in sealing relationship with said base.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the step of reducing dead volume space within said primary capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said filling material is selected from the group consisting of gelatin, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose, polyvinylacetate-phtalate, polymerisates of acrylic or methacrylic esters and combinations thereof.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said cap comprises a configuration sufficient for reducing dead volume space within said capsule.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said first receiving chamber is selected from the group

consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said physical state of said ingredient in said receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said second receiving chamber is selected from the group consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said physical state of said ingredient in said second receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient in said first receiving chamber comprises a pharmaceutical and said ingredient in said second receiving chamber is selected from the group consisting of a pharmaceutical.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said time-release coating of said second receiving chamber is different from said time-release coating of said first receiving chamber.

In another embodiment of the present invention, there is an encapsulation process as defined above, further comprising the steps of positioning a second dividing wall along said length of said extending body of said base, said second dividing wall adapted to form a third receiving chamber; and introducing at least one ingredient having a physical state into said third receiving chamber.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said ingredient introduced into said third receiving chamber is selected from the group consisting of a pharmaceutical, a biotechnical, a nutraceutical, a vitamin, a dietary supplement and a mineral.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said physical state of said ingredient introduced into said third receiving chamber is selected from the group consisting of a solid, a liquid, a gas and a dispersion.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said second dividing wall comprises a time-release coating.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said capsule further comprises a soft elastic capsule formed of a material selected from the group consisting of glycerin and sorbitol.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said lubricant is selected from the group consisting of aluminiumstearate, calciumstearate, magnesiumstearate, tinstearate, talc, sodium lauryl sulfate, lecithins, mineral oils, stearic acid, silicones and combinations thereof.

In another embodiment of the present invention, there is an encapsulation process as defined above, wherein said base and said cap of said capsule are formed having different colors.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and features of the present invention will become roe fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict only typical embodiments of the invention and are, therefore, not to be considered limiting of its scope, the invention will be described with additional specificity and detail through use of the accompanying drawings in which:

FIG. **1** is a flow diagram illustrating one presently preferred embodiment of a process of the present invention comprising the steps of introducing at least one active ingredient or medicament having a solid physical state into a secondary capsule and introducing the secondary capsule into a primary capsule further including at least one active ingredient or medicament having a liquid physical state;

FIG. **2** is a cross-sectional view illustrating another presently preferred embodiment of a multi-compartment capsule of the present invention wherein a primary capsule houses a secondary capsule and a secondary capsule houses a tertiary capsule, wherein each of the capsules include one or more active ingredients or medicaments and the active ingredient(s) introduced into at least two of the capsules comprise different physical states;

FIG. **3** is a perspective view illustrating yet another presently preferred embodiment of a multi-compartment capsule comprising a base, a cap and a dividing wall positioned between the base and the cap, wherein the dividing wall facilitates the formation of at least two, independent receiving chambers for receiving one or more active ingredients or medicaments having different physical states;

FIG. **4** is a cross-sectional view of the multi-compartment capsule shown in FIG. **3** wherein the base, the dividing wall defining the two receiving chambers and the cap are assembled to form a capsule of the present invention and wherein one or more active ingredients or medicaments having different physical states are introduced into the receiving chambers;

FIG. **5** is a perspective view illustrating an alternate presently preferred embodiment of a multi-compartment capsule of the present invention having a primary capsule comprising a capsular base configured with a longitudinally extending body, a corresponding cap and a series of dividing walls disposed in spaced apart relationship along the length of the longitudinally extending body of the base, wherein the dividing walls define a plurality of independent receiving chambers having an internal periphery sufficient for introducing one or more active ingredients or medicaments having different physical states therein and for introducing a secondary capsule, having one or more active ingredients contained therein, within at least one of said receiving chambers;

FIG. **6** is a cross-sectional view of the multi-compartment capsule shown in FIG. **5** wherein the base and the cap are assembled to form a single dosage capsule having a series of dividing walls that define a plurality of chambers for receiving one or more active ingredients or medicaments, wherein the active ingredient(s) in at least two of the receiving chambers comprise different physical states;

FIG. **7** is a perspective view illustrating yet another presently preferred embodiment of a multi-compartment capsule of the present invention having a primary capsule comprising a capsular base configured with a longitudinally extending body, a corresponding cap and a series of dividing walls disposed in spaced apart relationship, both vertically and horizontally, along the length of the longitudinally extending body of the base, wherein the dividing walls define a plurality of independent receiving chambers having an internal periphery sufficient for introducing one or more active ingredients or medicaments having different physical states therein;

FIG. **8** is a perspective view illustrating an alternate preferred embodiment of the multi-compartment capsule shown in FIG. **7**, wherein the multi-compartment capsule includes a

primary capsule comprising a capsular base configured with a longitudinally extending body, a corresponding cap and a series of dividing walls disposed in spaced apart relationship, both vertically and horizontally, along the length of the longitudinally extending body of the base, wherein the dividing walls define a plurality of independent receiving chambers having an internal periphery sufficient for introducing one or more active ingredients or medicaments having different physical states therein and for introducing a secondary capsule, having one or more active ingredients contained therein, within at least one of said receiving chambers;

FIG. **9** is a perspective view illustrating yet another presently preferred embodiment of a multi-compartment capsule of the present invention wherein the multi-compartment capsule shown in FIG. **7** is introduced within the internal periphery of a receiving chamber of a primary capsule having one or more active ingredients also contained therein;

FIG. **10** is a cross-sectional view illustrating a presently preferred embodiment of a multi-compartment capsule of the present invention including a secondary capsule having one or more active ingredients or medicaments selectively introduced into the internal periphery of a primary capsule having one or more active ingredients or medicaments, wherein the active ingredient(s) introduced into the primary capsule comprises a physical state (e.g., solid, liquid, gas or dispersion) which differs from the physical state of the active ingredient(s) introduced into the internal periphery of the secondary capsule, the primary capsule further comprising a cap having a generally U-shaped configuration adapted to provide a sealing relationship when engaging the corresponding base, thereby reducing dead space volume in the internal periphery of the receiving chamber of the base;

FIG. **11** is a perspective view illustrating yet another presently preferred embodiment of a multi-compartment capsule of the present invention including a secondary capsule having one or more active ingredients or medicaments and having a size and shape sufficient for being selectively introduced into the internal periphery of a primary capsule having one or more active ingredients or medicaments, wherein the active ingredient(s) introduced into the primary capsule comprises a physical state (e.g., solid, liquid, gas or dispersion) which differs from the physical state of the active ingredient(s) introduced into the internal periphery of the secondary capsule, the primary capsule further comprising a filling material introduced into the internal periphery of the cap having a general conical configuration and adapted to provide a sealing relationship when engaging the corresponding base, thereby reducing dead space volume in the internal periphery of the receiving chamber of the base;

FIG. **12** is a cross-sectional view of the multi-compartment capsule shown in FIG. **11** wherein a sufficient amount of filling material is introduced into the internal periphery of the cap, thereby functioning to eliminate or significantly reduce the dead space volume in the receiving chamber of the primary capsule; and

FIG. **13** is a cross-sectional view illustrating an alternate presently preferred embodiment of a multi-compartment capsule of the present invention comprising a tertiary capsule having one or more active ingredients or medicaments and having a size a shape sufficient for being introduced into at least a portion of the internal periphery of the receiving chamber of a secondary capsule having one or more active ingredients or medicaments also introduced therein, the size and shape of the secondary capsule sufficient for being selectively introduced into the internal periphery of a primary capsule having one or more active ingredients or medicaments, wherein the active ingredient(s) introduced into the primary capsule comprises a physical state (e.g., solid, liquid, gas or dispersion) which differs from the physical state of the active ingredient(s) introduced into the receiving chambers of the secondary and tertiary capsules, the primary capsule further comprising a filling material introduced into the internal periphery of the cap laving a general conical configuration and adapted to provide a sealing relationship when engaging the corresponding base, thereby reducing dead space volume in the internal periphery of the receiving chamber of the base of the primary capsule.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

It will be readily understood that the components of the present invention, as generally described and illustrated in the Figures herein, could be arranged and designed in a wide variety of different configurations and process steps. Those of ordinary skill in the art will, of course, appreciate that various modifications to the details herein may easily be made without departing from the essential characteristics of the invention, as described. Thus, the following more detailed description of the embodiments of apparatus and methods of the present invention, as represented in FIGS. **1** though **13**, is not intended to limit the scope of the invention, as claimed, but it is merely representative of the presently preferred embodiments of the invention.

The presently preferred embodiments of the invention will be best understood by reference to the drawings, wherein like parts are designated by like numerals throughout.

One presently preferred embodiment of the present invention, designated generally at **10**, is best illustrated in FIG. **1**. As shown, a multi-compartment capsule **10** is illustrated comprising a primary capsule **11** and a secondary capsule **20** selectively introduced within at least a portion of an internal periphery of the primary capsule. The secondary capsule **20** includes a base **24**, a corresponding cap **22** and a receiving chamber **28** formed between the base and cap. The receiving chamber **28** is configured having an internal periphery sufficient for receiving at least one active ingredient or medicament (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein. In similar structural design, the primary capsule **11** may be formed having a base **14**, a corresponding cap **12** and a receiving chamber **18** formed between the base and cap. The receiving chamber **18** of the primary capsule **11** is preferably formed having an internal periphery sufficient for receiving the secondary capsule **20**, together with at least one active ingredient or medicament (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein.

Still referring to FIG. **1**, one presently preferred embodiment of an encapsulation process for forming a multi-compartment capsule **10** is comprising the steps of: (1) providing a primary capsule **11** having a base **14**, a corresponding cap **12** and a receiving chamber **18**; (2) providing a secondary capsule **20** having a base **24**, a corresponding cap **22** and a receiving chamber **28**; (3) introducing at least one ingredient or medicament (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary, supplement, mineral or combination thereof) having a first physical state (e.g., solid, liquid, gas or dispersion) into at least a portion of the receiving chamber **28** of the secondary capsule **20** and selectively positioning the cap **22** in sealing relationship with the base **24**; (4) introducing at least one ingredient or medicament (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) having a second

physical state (e.g., solid, liquid, gas or dispersion) into at least a portion of the receiving chamber **18** of the primary capsule **11**, wherein the first physical state of the ingredient(s) in the secondary capsule is different from the second physical state of the ingredient(s) in the primary capsule; and (5) introducing the secondary capsule **20** into at least a portion of the receiving chamber **18** of the primary capsule **11** and selectively positioning the cap **12** in sealing relationship with the base **14** to form a single dosage multi-compartment capsule.

As shown, a solid is selectively introduced within at least a portion of the internal periphery of the receiving chamber **28** of the secondary capsule **20** and a liquid is selectively introduced within at least a portion of the internal periphery of the receiving chamber **18** of the primary capsule **11**. Although the ingredient(s) introduced into the receiving chamber **18** of the primary capsule **11** may be the same or different from the ingredient(s) introduced into the receiving chamber **28** of the secondary capsule, the active ingredient(s) in the primary capsule **11** have a physical state (i.e., solid, liquid, gas or dispersion) that varies from the physical state of the active ingredient(s) in the secondary capsule **20**. Accordingly, those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states of the active ingredient(s) selectively positionable within the receiving chambers **18**, **28** of the primary and secondary capsules, respectively, which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Referring now to FIG. **2**, an alternate presently preferred embodiment of a multi-compartment capsule **110** is shown comprising a primary capsule **111**, a secondary capsule **120** and a tertiary capsule **130**. The tertiary capsule **130** includes a base **134**, a corresponding cap **132** and a receiving chamber **138** formed between the base and cap. The receiving chamber **138** is preferably formed having an internal periphery sufficient for receiving at least one active ingredient or medicament (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof). Structurally, the tertiary capsule **130** is configured having a size sufficient for being selectively introduced within at least a portion of an internal periphery of a receiving chamber **128** defined between a base **124** and a corresponding cap **122** of the secondary capsule **120**. One or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) may be introduced into at least a portion of the receiving chamber **128** of the secondary capsule **120**, together with the introduction of the tertiary capsule **130** comprising its active ingredient(s). The secondary capsule **120** having its active ingredient(s) and housing the tertiary capsule **130** with its active ingredient(s) may then be selectively introduced within at least a portion of an internal periphery of a receiving chamber **118** of the primary capsule **111** defined between a base **114** and a corresponding cap **112**. Preferably, the receiving chamber **118** of the primary capsule **111** may also include one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) introduced therein.

Still referring to FIG. **2**, another presently preferred embodiment of an encapsulation process for forming a multi-compartment capsule **110** may comprise the steps of: (1) providing a primary capsule **111** having a base **114**, a corresponding cap **112** and a receiving chamber **118** defined between the base and cap; (2) providing a secondary capsule **120** having a base **124**, a corresponding cap **122** and a receiving chamber **128** defined between the base and cap: (3) providing a tertiary capsule **130** having a base **134**, a corresponding cap **132** and a receiving chamber **138** defined between the base and cap; (4) introducing at least one ingredient (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) having a first physical state (e.g., solid, liquid, gas or dispersion) into at least a portion of the receiving chamber **138** of the tertiary capsule **130** and selectively positioning the cap **132** in sealing relationship with the base **134**; (5) introducing at least one ingredient (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) having a second physical state (e.g., solid, liquid, gas or dispersion) into at least a portion of the receiving chamber **128** of the secondary capsule **120**, wherein the first physical state of the ingredient(s) in the tertiary capsule **130** are the same as the second physical state of the ingredient(s) in the secondary capsule **120**; (6) introducing the tertiary capsule **130** into at least a portion of the receiving chamber **218** of the secondary capsule **120** and selectively positioning the cap **122** in sealing relationship with the base **124**; (7) introducing at least one ingredient (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) having a third physical state (e.g., solid, liquid, gas or dispersion) into at least a portion of the receiving chamber **118** of the primary capsule **111**, wherein the third physical state of the ingredient(s) in the primary capsule are different from the first and second physical states of the ingredient(s) in the tertiary capsule **130** and the secondary capsule **120**, respectively; and (8) introducing the secondary capsule **120** into at least a portion of the receiving chamber **118** of the primary capsule **111** and selectively positioning the cap **112** in sealing relationship with the base **114** to form a single dosage multi-compartment capsule.

In the presently preferred embodiment illustrated in FIG. **2**, a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **118** of the primary capsule **11**, a solid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **128** of the secondary capsule **120** and a solid may be selectively introduced into at least a portion of the receiving chamber **138** of the tertiary capsule **130**. Although the ingredient(s) selectively introduced into the receiving chambers **118**, **128**, **138** of the primary, secondary and tertiary capsules **111**, **120**, **130**, respectively, may be the same or different, the active ingredient(s) in at least two of the receiving chambers comprise at least two different physical states (e.g., solid, liquid, gas or dispersion). It is further contemplated herein as an alternate embodiment that the active ingredient(s) introduced in the receiving chamber **118** of the primary capsule **111** comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of the active ingredient(s) contained within the receiving chamber **128** of the secondary capsule **120** which is different from the physical state of the active ingredient(s) contained within the receiving chamber **138** of the tertiary capsule **130**. Those skilled in the art will readily recognize other possible modifications and adaptations relative to contemplated variations in physical states of the active ingredient(s) selectively introduced within the receiving chambers **118**, **128**, **138** of the primary, secondary and tertiary capsules, respectively, which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of

the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Referring now to FIGS. **3** and **4**, another presently preferred embodiment of a multi-compartment capsule **210** is shown comprising a base **214**, a corresponding cap **212** and a dividing wall **216** positionable between the base and the cap. Structurally, the size, shape and positioning of the dividing wall **216** relative to the base **214** and corresponding cap **212** facilitates the formation of at least two, independent and separate receiving chambers **218***a*, **218***b*, each having an internal periphery sufficient for receiving one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein. As best shown in FIG. **4**, the dividing wall **216** seats within the internal periphery of both the base **214** and the corresponding cap **212**. After introducing one or more active ingredients or medicaments into receiving chamber **218***b* and disposing the dividing wall **216** relative thereto, one or more active ingredients or medicaments (e.g. pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) may be introduced into receiving chamber **218***a* and the cap may be selectively positioned in sealing relationship with the base **214** to form one presently preferred embodiment of the single, dosage multi-compartment capsule **210**. Moreover, the dividing wall **216** may functionally assist in forming a sealing relationship between the base **214** and corresponding cap **212** of the multi-compartment capsule **210**, if desired.

In one presently preferred embodiment of the multi-compartment capsule **211** of the present invention, a solid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **218***a* and a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **218***b*. Although the ingredient(s) introduced into the receiving chamber **218***a* may be the same or different from the ingredient(s) introduced into the receiving chamber **218**, the active ingredient(s) in the first receiving chamber **218***a* preferably comprise a physical state (e.g., solid, liquid, gas or dispersion) that is different from the physical state of the active ingredient(s) in the second receiving chamber **218***b*. Those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states (e.g., solid, liquid, gas and dispersion) of the active ingredient(s) selectively positionable within the receiving chambers **218***a*, **218***b* which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Referring now to FIGS. **5** and **6**, another presently preferred embodiment of a multi-compartment capsule, designated as **310**, is shown including a primary capsule **311** comprising a capsular base **314** configured having an elongated or longitudinally extending body, a corresponding cap **312** and a plurality of dividing walls **316** selectively disposed along the length of the longitudinally extending body of the base. Preferably, the structural size, shape and positioning of the dividing walls **316***a*, **316***b*, **316***c* along the length of the elongated body of the base **314** facilitate the formation of a plurality of independent receiving chambers **318***a*, **318***b*, **318***c*, **318***d*. Each receiving chamber **318***a*, **318***b*, **318***c*, **318***d* of the primary capsule **311** having an internal periphery sufficient for receiving one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein.

As best shown in FIG. **6**, the dividing walls **316***a*, **316***b*, **316***c* are preferably seated within the internal periphery of the base **314** of the primary capsule **311** and in a spaced apart relationship along the length of the longitudinally extending body and form four independent receiving chambers **318***a*, **318***b*, **318***c*, **318***d*. In one presently preferred embodiment of the multi-compartment capsule **310** of the present invention, each of the receiving chambers **318***a*, **318***b*, **318***c* comprises at least one active ingredient or medicament having a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of the ingredient(s) in the other receiving chambers.

As illustrated by way of example, and not by way of restriction, a solid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **318***a*, a dispersion may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **318***b*, a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **318***c* and a secondary, capsule **320** may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **318***d*. As contemplated herein, receiving chamber **318***d* may be further configured having an internal periphery sufficient for receiving a secondary capsule **320**, together with at least one active ingredient or medicament therein.

One presently preferred embodiment of an encapsulation process, as defined by the structural configuration of the multi-compartment capsule **310** illustrated in FIGS. **5** and **6**, may comprise the steps of: (1) introducing a secondary capsule **320** (e.g., tablet) and one or more active ingredients or medicaments into receiving chamber **318***d*; (2) selectively positioning dividing wall **316***c* along the length of the elongated body of the base **314**; (3) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **318***c*; (4) selectively positioning dividing wall **316***b* along the length of the elongated body of the base **314** in a spaced apart relationship to dividing wall **316***c*; (5) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **318***b*; (6) selectively positioning dividing wall **316***a* along the length of the elongated body of the base **314** in a spaced apart relationship to dividing wall **316***b*; and (7) selectively positioning the cap **312** in sealing relationship with the base **314** to form a presently preferred embodiment of a single, dosage multi-compartment capsule **310**. The dividing wall **316***a* may also function in the formation of the sealing relationship between the base **314** and the corresponding cap **312**, if desired.

Although the ingredient(s) introduced into one of the receiving chambers **318** may be the same ingredient or may be different from the ingredient(s) introduced into the other receiving chambers, the active ingredient(s) in at least two of the receiving chambers **318** preferably comprise a physical state (e.g., solid, liquid, gas or dispersion) that is different from the physical state of the active ingredient(s) in one or more of the remaining receiving chambers. Those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states (e.g., solid, liquid, gas and dispersion) of the active ingredient(s) selectively introduced within the receiving chambers **318** which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary

of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Another presently preferred embodiment of a multi-compartment capsule of the present invention, generally designated as **410** in FIG. **7**, is shown comprising a capsular base **414** preferably configured having an elongated or longitudinally extending body, a corresponding cap **412** and a plurality of dividing walls **416** selectively disposed along the length of the longitudinally extending body of the base, both horizontally and vertically. In structural design, the size, shape and positioning of the dividing walls **416***a*, **416***b*, **416***c*, **416***d*, **416***e* along the length of the longitudinally extending body of the base **414** facilitate the formation of a plurality of independent receiving chambers **418**.

In one presently preferred embodiment, the dividing walls **416***a*, **416***b*, **416***c*, **416***d*, **416***e* are preferably disposed or seated in a spaced apart relationship within the internal periphery of the base **414** of the primary capsule **411** along the length of the longitudinally extending body, whereby forming five (5) independent receiving chambers **418***a*, **418***b*, **418***c*, **418***d*, **418***e*. Each receiving chamber **418***a*, **418***b*, **418***c*, **418***d*, **418***e* of the primary capsule **411** are preferably configured having an internal periphery dimensionally sufficient for receiving one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein.

Still referring to FIG. **7**, one presently preferred embodiment of an encapsulation process, as defined by the structural configuration of the multi-compartment capsule **410**, may comprise the steps of: (1) introducing one or more active ingredients or medicaments into receiving chamber **418***e* defined by dividing walls **416***d*, **416***e* which are vertically disposed along the length of the elongated body of the base **414**; (2) introducing one or more active ingredients or medicaments into receiving chamber **418***d* defined by dividing walls **416***c*, **416***d* which are vertically disposed along the length of the elongated body of the base **414**; (3) introducing one or more active ingredients or medicaments into receiving chamber **418***c* defined by dividing walls **416***b*, **416***c* which are vertically disposed along the length of the elongated body of the base **414**; (4) introducing one or more active ingredients or medicaments into receiving chamber **418***b* defined by dividing walls **416***b*, **416***e* which are vertically disposed along the length of the elongated body of the base **414**; (5) disposing dividing wall **416***a* along the length of the elongated body of the base **414** perpendicular to the disposition of dividing walls **416***b*, **416***c*, **416***d*, **416***e* and introducing one or more active ingredients or medicaments into receiving chamber **418***a*; and (6) selectively positioning the cap **412** in sealing relationship with the base **414** to form one presently preferred embodiment of a single, dosage multi-compartment capsule **410**. As appreciated, the dividing wall **416***a* may also function in the formation of the sealing relationship between the base **414** and the corresponding cap **412**, if structurally desired.

As illustrated by way of example, and not by way of restriction, a solid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **418***a*, a dispersion may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **418***b*, a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **418***c*, a solid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **418***d* and a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **418***e*.

Although the ingredient(s) introduced into one of the receiving chambers **418** may be the same ingredient or may be different from the ingredient(s) introduced into the other receiving chambers, the active ingredient(s) in at least two of the receiving chambers **418** preferably comprise a physical state (e.g., solid, liquid, gas or dispersion) that is different from the physical state of the active ingredient(s) in one or more of the remaining receiving chambers. Those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states (e.g., solid, liquid, gas and dispersion) of the active ingredient(s) selectively introduced within the receiving chambers **418** which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Referring now to FIG. **8**, an alternate presently preferred embodiment of a multi-compartment capsule **510** includes a capsular base **514** preferably configured having an elongated or longitudinally extending body, a corresponding cap **512** and a plurality of dividing walls **516** selectively disposed along the length of the longitudinally extending body of the base, both horizontally and vertically. In structural design, the size, shape and positioning of the dividing walls **516***a*, **516***b*, **516***c*, **516***d* along the length of the longitudinally extending body of the base **514** facilitate the formation of a plurality of independent receiving chambers **518**.

In one presently preferred embodiment, the dividing walls **516***a*, **516***b*, **516***c*, **516***d*, **516***e* are preferably disposed or seated in a spaced apart relationship within the internal periphery of the base **514** of the primary capsule **511** along the length of the longitudinally extending body, whereby forming five (5) independent receiving chambers **518***a*, **518***b*, **518***c*, **518***d*, **518***e*. Each of the receiving chamber **518***a*, **518***b*, **518***c*, **518***d*, **518***e* of the primary capsule **411** are preferably configured having an internal periphery dimensionally sufficient for receiving one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein. Moreover, receiving chamber **518***d* is formed having an internal periphery sufficient for receiving a secondary capsule **520**. The secondary capsule **520** being configured with a base **524**, corresponding cap **522** and a dividing wall **526** defining a first receiving chamber **528***a* and a second receiving chamber **528***b*. The first receiving chamber **528***a* is preferably configured having an internal periphery sufficient for receiving one or more active ingredients or medicaments (e.g. pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) having a first physical state (e.g., solid, liquid, gas or dispersion) therein. Similarly, the second receiving chamber **528***b* is configured having an internal periphery sufficient for receiving one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) having a second physical state (e.g., solid, liquid, gas or dispersion), wherein the physical state of the ingredient(s) in the second receiving chamber varies from the physical state of the ingredient(s) in the first receiving chamber. As contemplated and disclosed hereinabove, after the ingredients are introduced into the respective receiving chamber **528***a*, **528***b*, the cap **522** may be positioned in sealing relationship with the base **524** of the secondary capsule **520**.

Still referring to FIG. **8**, as illustrated by way of example, and not by way of restriction, a solid may be selectively

introduced into at least a portion of the internal periphery of the receiving chamber **528***a* and a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **528***b*. Although the ingredient(s) introduced into one of the receiving chamber **528***a* may be the same ingredient or maybe different from the ingredient(s) introduced into receiving chamber **528***b*, the active ingredient(s) in the first receiving chamber **528***a* comprise a physical state (e.g., solid, liquid, gas or dispersion) that is different from the physical state of the active ingredient(s) in receiving chambers **528***b*. Those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states (e.g., solid, liquid, gas and dispersion) of the active ingredient(s) selectively introduced within the receiving chambers **528** which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles

One presently preferred embodiment of an encapsulation process, as defined by the structural configuration of the multi-compartment capsule **510**, may comprise the steps of: (1) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **518***e* defined by dividing walls **516***d*, **516***e* which are disposed vertically along the length of the elongated body of the base **514**; (2) introducing a secondary capsule **520** into receiving chamber **518***d* defined by dividing walls **516***c*, **516***d* which are disposed vertically along the length of the elongated body of the base **514**; (3) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **518***c* defined by dividing walls **516***b*, **516***c* which are disposed vertically along the length of the elongated body of the base **514**; (4) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **518***b* defined by dividing walls **516***b*, **516***e* which are disposed vertically along the length of the elongated body of the base **514**; (5) disposing dividing wall **516***a* along the length of the elongated body of the base **514** perpendicular to the disposition of dividing walls **516***b*, **516***c*, **516***d*, **516***e* and introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **518***a*; and (6) selectively positioning the cap **512** in sealing relationship with the base **514** to form one presently preferred embodiment of a single, dosage multi-compartment capsule **510**. As appreciated, the dividing wall **516***a* may also function in the formation of the sealing relationship between the base **514** and the corresponding cap **512**, if structurally desired.

As illustrated by way of example, and not by way of limitation, a solid may be selectively introduced into at least a portion of the internal periphery of receiving chamber **518***a*, a dispersion may be selectively introduced into at least a portion of the internal periphery of receiving chamber **518***b*, a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **518***c* and a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **518***e*. Although the ingredient(s) introduced into one of the receiving chambers **518** may be the same ingredient or may be different from the ingredient(s) introduced into the other receiving chambers, the active ingredient(s) in at least two of the receiving chambers **518** preferably comprise a physical state (e.g., solid, liquid, gas or dispersion) that is different from the physical state of the active ingredient(s) in one or more of the remaining receiving chambers. Those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states (e.g., solid, liquid, gas and dispersion) of the active ingredient(s) selectively introduced within the receiving chambers **518** which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Referring now to FIG. **9**, yet another presently preferred embodiment of a multi-compartment capsule of the present invention, generally designated as **610**, is shown comprising a primary capsule **611** and a secondary capsule **620** selectively positionable within at least a portion of an internal periphery of the primary capsule. The primary capsule **611** having a receiving chamber **618** preferably formed having an internal periphery sufficient for receiving the secondary capsule **620**, together with one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein. The secondary capsule **620** comprising a capsular base **624** preferably configured having an elongated or longitudinally extending body, a corresponding cap **622** and a plurality of dividing walls **626** selectively disposed along the length of the longitudinally extending body of the base, both horizontally and vertically. In structural design, the size, shape and positioning of the dividing walls **626***a*, **626***b*, **626***c*, **626***d* along the length of the longitudinally extending body of the base **624** facilitate the formation of a plurality of independent receiving chambers **628**.

In one presently preferred embodiment, the dividing walls **626***a*, **626***b*, **626***c*, **626***d*, **426***e* are preferably disposed or seated in a spaced apart relationship within the internal periphery of the base **624** of the secondary capsule **620** along the length of the longitudinally extending body, whereby forming five (5) independent receiving chambers **628***a*, **628***b*, **628***c*, **628***d*, **628***e*. Each receiving chamber **628***a*, **628***b*, **628***c*, **628***d*, **628***e* of the secondary capsule **620** are preferably configured having an internal periphery dimensionally sufficient for receiving one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) therein.

One presently preferred embodiment of an encapsulation process, as defined by the structural configuration of the multi-compartment capsule **610**, may comprise the steps of: (1) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **628***e* defined by dividing walls **626***d*, **626***e* which are vertically disposed along the length of the elongated body of the base **624**; (2) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **628***d* defined by dividing walls **626***c*, **626***d* which are vertically disposed along the length of the elongated body of the base **624**; (3) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **628***c* defined by dividing walls **626***b*, **626***c* which are vertically disposed along the length of the

elongated body of the base **624**; (4) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **628***b* defined by dividing walls **626***b*, **626***e* which are vertically disposed along the length of the elongated body of the base **624**; (5) disposing dividing wall **626***a* along the length of the elongated body of the base **624** perpendicular to the disposition of dividing walls **626***b*, **626***c*, **626***d*, **626***e* and introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **628***a*; (6) selectively positioning the cap **622** in sealing relationship with the base **624** of the secondary capsule **620**; (7) introducing the secondary capsule **620** and one or more ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into the receiving chamber **618** of the primary capsule **611**; and (8) selectively positioning the cap **612** in sealing relationship with the base **614** of the primary capsule **611** to form one presently preferred embodiment of a single, dosage multi-compartment capsule **610**.

As illustrated by way of example, and not by way of restriction, a solid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **628***a*, a dispersion may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **628***b*, a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **628***c*, a solid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **628***d* and a liquid may be selectively introduced into at least a portion of the internal periphery of the receiving chamber **628***e* of the secondary capsule **620**. In addition, a gas may be introduced into at least a portion of the internal periphery of the receiving chamber **618** of the primary capsule **611**.

Although the ingredient(s) introduced into one of the receiving chambers **618**, **628** of the primary and secondary capsules, respectively, may be the same ingredient or may be different from the ingredient(s) introduced into the other receiving chambers, the active ingredient(s) in at least two of the receiving chambers **618**, **628** preferably comprise a physical state (e.g., solid, liquid, gas or dispersion) that is different from the physical state of the active ingredient(s) in one or more of the remaining receiving chambers. Those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states (e.g., solid, liquid, gas and dispersion) of the active ingredient(s) selectively introduced within the receiving chambers **618**, **628** which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Another presently preferred embodiment of a multi-compartment capsule of the present invention, generally designated as **710** in FIG. **10**, is shown comprising a secondary capsule **720** including one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) within at least a portion of the internal periphery of a receiving chamber **728** and having a size and shape sufficient for being selectively introduced within at least a portion of the internal periphery of a receiving chamber **718** of a primary capsule **711**. The primary capsule **711** also includes one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) introduced within the internal periphery of the receiving chamber **718**, wherein the active ingredient(s) introduced into the primary capsule comprises a physical state (e.g., solid, liquid, gas or dispersion) which differs from the physical state of the active ingredient(s) introduced into the internal periphery of the secondary capsule. In structural design, the primary capsule **711** further comprises a cap **712** having a generally U-shaped configuration adapted to provide a sealing relationship when engaging the corresponding base **714**, thereby reducing dead space volume in the internal periphery of the receiving chamber **718** of the base. In this regard, the configuration of the cap **712** generally eliminates or substantially reduces the potential dead space volume within the internal periphery of the receiving chamber **718**, thus functionally negating the opportunity for reaction between an air bubble and the active ingredient(s) introduced into the base **714** of the primary capsule **711**.

One presently preferred embodiment of an encapsulation process, as defined by the structural configuration of the multi-compartment capsule **710**, may include the steps of: (1) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into receiving chamber **728**; (2) selectively positioning the cap **722** in sealing relationship with the base **724** of the secondary capsule **720**; (3) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof), together with the secondary capsule **720**, into the receiving chamber **718** of the primary capsule **711**; and (4) selectively positioning the cap **712** having a general U-shaped configuration in sealing relationship with the base **714** of the primary capsule **711** to form a presently preferred embodiment of a single, dosage multi-compartment capsule **710**, wherein eliminating or substantially reducing dead space volume within the internal periphery of the receiving chamber **718**.

A solid is selectively introduced within at least a portion of the internal periphery of the receiving chamber **728** of the secondary capsule **720** and a liquid is selectively introduced within at least a portion of the internal periphery of the receiving chamber **718** of the primary capsule **711**. Although the ingredient(s) introduced into the receiving chamber **718** of the primary capsule **711** may be the same or different from the ingredient(s) introduced into the receiving chamber **728** of the secondary capsule **720**, the active ingredient(s) in the primary capsule have a physical state (i.e., solid, liquid, gas or dispersion) that various from the physical state of the active ingredient(s) in the secondary capsule. Accordingly, those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states of the active ingredient(s) selectively introduced within the receiving chambers **718**, **728** of the primary and secondary capsules **711**, **720**, respectively, which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Referring now to FIGS. **11** and **12**, yet another presently preferred embodiment of a multi-compartment capsule **810** of the present invention is shown comprising a secondary capsule **820** including one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof)

within at least a portion of the internal periphery of a receiving chamber **828**. The secondary capsule **820** being preferably formed having a size and shape sufficient for being selectively introduced within at least a portion of the internal periphery of a receiving chamber **818** of a primary capsule **811**. Similarly, the primary capsule **811** includes one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) introduced within the internal periphery of the receiving chamber **818**, together with the secondary capsule **820**, wherein the active ingredient(s) introduced into the primary capsule comprises a physical state (e.g., solid, liquid, gas or dispersion) which differs from the physical state of the active ingredient(s) introduced into the internal periphery of the secondary capsule **820**.

In preferred structural design, the primary capsule **811** comprises a cap **812** having a general cylindrical configuration adapted to provide a sealing relationship when engaging the corresponding base **814** to form a single dosage, multi-compartment capsule **810**. An amount of filling material **840** may be introduced into the internal periphery of the cap **812** to fill, either partially or completely, the inner volume of the cap, thereby reducing the dead space volume in the internal periphery of the receiving chamber **818** of the base. In this regard, the configuration of the addition of the filler material **840** relative to the internal periphery of the cap **812** generally eliminates or substantially reduces the potential dead space volume within the internal periphery of the receiving chamber **818**, thus functionally negating the potential for a reaction between an air bubble and the active ingredient(s) introduced into the base **814** of the primary capsule **811**.

Preferably, the filling material **840** introduced into at least a portion of the internal periphery of the cap **812** may include a hydrophilic polymer, such as gelatin. It will be readily appreciated by those skilled in the art that other filling materials may be used, such as, for example, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carageenan, xanthan gum, phtalated gelatin, succinated gelatin cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose, (HPMC), oleoresin, polyvinylacetate-phtalate, polymerisates of acrylic or methacylic esters, and mixtures thereof, or the like, and/or combinations thereof. In other presently preferred embodiments of the present invention, the filling material **840** may include the introduction of an inert compound, for example, nitrogen gas into at least a portion of the internal periphery of the cap **811**. Based on the principals of eliminating or reducing the volume dead space in multi-compartment capsules disclosed herein, those skilled in the art will readily recognize other possible modifications and combinations which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or process for implementing those principles.

The filling material **840** introduced within at least a portion of the internal periphery of the cap **812** of the primary capsule **811** is generally intended to promote a binding contact with at least a portion of the cap **822** of the secondary capsule **820**, thereby seating at least a portion of the secondary capsule within the cap of the primary capsule and forming a molded appearance. As appreciated, the introduction of the filling material **840** into the cap **812** of the primary capsule **811** prior to the joining and sealing process may prevent the opportunity for a reaction between an air-bubble and the active medicament(s) within the receiving chamber **818** of the primary capsule, while preserving the overall rounded shape of the multi-compartment capsule **910** for ease of swallowing by a consumer.

As best illustrated in FIG. **12**, one presently preferred embodiment of an encapsulation process, as defined by the structural configuration of the multi-compartment capsule **810**, may include the steps of: (1) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin; dietary supplement, mineral or combination thereof) into at least a portion of the receiving chamber **828**; (2) selectively positioning the cap **822** in sealing relationship with the base **824** of the secondary capsule **820**; (3) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof), together with the secondary capsule **820**, into at least a portion of the receiving chamber **818** of the primary capsule **811**; (4) introducing a filling material **840** into at least a portion of the internal periphery of the cap **812** (i.e., filling the cap); and (5) selectively positioning the cap **812** having a general conical configuration in sealing relationship with the base **814** of the primary capsule **811** to form one presently preferred embodiment of a single, dosage multi-compartment capsule **810**, wherein eliminating or substantially reducing dead space volume within the internal periphery of the cap **812** and the receiving chamber **818**, respectively.

A solid may be selectively introduced within at least a portion of the internal periphery of the receiving chamber **828** of the secondary capsule **820** and a liquid may be selectively introduced within at least a portion of the internal periphery of the receiving chamber **818** of the primary capsule **811**. Although the ingredient(s) introduced into the receiving chamber **818** of the primary capsule **811** may be the same or different from the ingredient(s) introduced into the receiving chamber **828** of the secondary capsule **820**, the active ingredient(s) in the primary capsule have a physical state (i.e., solid, liquid, gas or dispersion) that various from the physical state of the active ingredient(s) in the secondary capsule. Accordingly, those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states of the active ingredient(s) selectively introduced within the receiving chambers **818**, **828** of the primary and secondary capsules **811**, **820**, respectively, which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Referring now to FIG. **13**, another presently preferred embodiment of a multi-compartment capsule, generally designated at **910**, is shown comprising a tertiary capsule **930** including one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) within at least a portion of the internal periphery of a receiving chamber **938** and having a size and shape sufficient for being introduced into the internal periphery of a receiving chamber **928** of a secondary capsule **920**. The secondary capsule **920** having one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) introduced within at least a portion of the internal periphery of a receiving chamber **928**, together with the tertiary capsule **930**. The secondary capsule **920** preferably formed having a size and shape sufficient for being selectively introduced within at least a portion of the internal periphery of a receiving cham-

ber **918** of a primary capsule **911**. Similarly, the primary capsule **911** may include one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) introduced within the internal periphery of the receiving chamber **818**, together with the secondary capsule **920** which houses the tertiary capsule **930**. In one presently preferred embodiment, the active ingredient(s) introduced into the secondary capsule **920** comprises a physical state (e.g., solid, liquid, gas or dispersion) which differs from the physical state of the active ingredient(s) introduced into the internal periphery of the primary capsule **911** and the internal periphery of the tertiary capsule **930**.

In preferred structural design, the primary capsule **911** comprises a cap **912** having a general cylindrical configuration adapted to provide a sealing relationship when engaging the corresponding base **914** to form a single dosage, multi-compartment capsule **910**. An amount of filling material **940** may be introduced into at least a portion of the internal periphery of the cap **912** to fill, either partially or completely, the inner volume of the cap, thereby reducing the dead space volume in the cap and the internal periphery of the receiving chamber **918** of the base. In this regard, the configuration of the addition of the filler material **940** relative to the internal periphery of the cap **912** may generally eliminate or substantially reduce the potential dead space volume within the internal periphery of the receiving chamber **918**, thus functionally negating the potential for a reaction between an air bubble and the active ingredient(s) introduced into the base **914** of the primary capsule **911**.

Preferably, the filling material **940** introduced into at least a portion of the internal periphery of the cap **912** may include a hydrophilic polymer, such as gelatin. It will be readily appreciated by those skilled in the art that other filling materials may be used, such as, for example, starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carrageenan, xanthan gum, phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methylcellulose, oleoresin, polyvinylacetatephtalate, polymerisates of acrylic or methacrylic esters, and mixtures thereof, or the like, and/or combinations thereof. In other presently preferred embodiments of the present invention, the filling material **840** may include the introduction of an inert compound, for example, nitrogen gas into at least a portion of the internal periphery of the cap **912**. Based on the principals of eliminating or reducing the volume dead space in multi-compartment capsules disclosed herein, those skilled in the art will readily recognize other possible modifications and combinations which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the preset invention, and not as restrictive to a particular structure or process for implementing those principles.

The filling material **940** introduced within at least a portion of the internal periphery of the cap **912** of the primary capsule **911** is generally intended to promote a binding contact with at least a portion of the cap **922** of the secondary capsule **920**, thereby seating at least a portion of the secondary capsule within the cap of the primary capsule and forming a molded appearance. As appreciated, the introduction of the filling material **940** into the cap **912** of the primary capsule **911** prior to the joining and sealing process tends to prevent the opportunity for a reaction between an air bubble and the active medicament(s) within the receiving chamber **918** of the primary capsule, while preserving the overall rounded shape of the multi-compartment capsule **910** for ease of swallowing by a consumer.

As best illustrated in FIG. **13**, one presently preferred embodiment of an encapsulation process, as defined by the structural configuration of the multi-compartment capsule **910**, may include, the steps of: (1) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof) into at least a portion of the receiving chamber **938** of a tertiary capsule **930**; (2) selectively positioning the cap **932** in sealing relationship with the base **934** of the tertiary capsule **930**; (3) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof), together with the tertiary capsule **930**, into at least a portion of the receiving chamber **928** of the secondary capsule **920**; (4) selectively positioning the cap **922** in sealing relationship with the base **924** of the secondary capsule **920**; (5) introducing one or more active ingredients or medicaments (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof), together with the secondary capsule **920**, into at least a portion of the receiving chamber **918** of the primary capsule **911**; (6) introducing a filling material **940** into at least a portion of the internal periphery of the cap **912** (i.e., preferably filling the cap); and (7) selectively positioning the cap **912** having a general conical configuration in seating relationship with at least a portion of the secondary capsule **920** and sealing the base **914** of the primary capsule **911** to form one presently preferred embodiment of a single, dosage multi-compartment capsule **910**, wherein eliminating or substantially reducing dead space volume within the internal periphery of the cap **912** and the receiving chamber **918**, respectively.

A solid may be introduced within at least a portion of the internal periphery of the receiving chamber **938** of the tertiary capsule **930**, a liquid may be introduced into at least a portion of the internal periphery of the secondary capsule **920** and a solid may be selectively introduced within at least a portion of the internal periphery of the receiving chamber **918** of the primary capsule **911**. Although the ingredient(s) introduced into the receiving chambers **918**, **928**, **938** of the primary, secondary and tertiary capsules **911**, **920**, **930**, respectively, may be the same or different from the ingredient(s) introduced into the other receiving chambers, the active ingredient(s) in at least two of the receiving chambers **918**, **928**, **938** have different physical states (i.e., solid, liquid, gas or dispersion). Those skilled in the art will readily recognize other possible modifications and adaptations relative to the contemplated variations in physical states of the active ingredient(s) selectively introduced within the receiving chambers **918**, **928**, **938** of the primary, secondary and tertiary capsules **911**, **920**, **930**, respectively, which are consistent with the spirit and scope of the present invention. It is intended, therefore, that the figures and examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Generally referring to FIGS. **1-13**, the component parts of the presently preferred embodiments of the multi-compartment capsules (i.e., capsular base, corresponding cap and dividing walls) of the present invention may comprise a hydrophilic polymer, such as gelatin (marine or animal based product). Other suitable materials forming the capsules may include starch, casein, chitosan, soya bean protein, safflower protein, alginates, gellan gum, carageenan, xanthan gum,

phtalated gelatin, succinated gelatin, cellulosephtalate-acetate, polyvinylacetate, hydroxypropyl methyl cellulose (HPMC), oleoresins, polyvinylacetate-phtalate, polymerisates of acrylic or methacrylic esters, and mixtures thereof, or the like, and/or combinations thereof. The material comprising the capsular components may further include between about 0% to 40% of pharmaceutically acceptable plasticizers based upon the weight of the hydrophilic polymer. Plasticizers that may be employed include, for example and not by way of limitation, polyethylene glycol, glycerol, sorbitol, dioctyl-sodium sulfosuccinate, triethyl citrate, tributyl citrate, 1,2-propyleneglycol, mono-acetates, di-acetates, or triacetates of glycerol, mixtures thereof, or the like, and/or combinations thereof. As appreciated, plasticizers may also be used in the development of a soft elastic shell, often referred to as a soft gelatin capsule or "soft gel" capsule, for a primary capsule, a secondary capsule and/or a tertiary capsule.

The capsular shell material may contain pharmaceutically acceptable lubricants in the range of about 0% to 10%, based upon the weight of the hydrophilic polymer. Lubricants that may be used include, for example and not by way of limitation, aluminum stearate, calcium stearate, magnesiumstearate, tin stearate, talc, sodium lauryl sulfate, lecithins, mineral oils, stearic acid, silicones, mixtures thereof, or the like, and/or combinations thereof. One presently preferred embodiment of the multi-compartmental capsules of the present invention (e.g., primary capsule, secondary capsule, tertiary capsule, etc.) may include, for example, LICAPS® capsules (for poorly soluble compounds), VCAPS™ capsules (made from cellulosic raw materials), CONI-SNAP® capsules and PRESS-FIT® capsules which are all presently manufactured by Capsugel, a subsidiary of Pfizer, Inc.

In one presently preferred embodiment of an encapsulation process, the primary capsule may be kept under conditions of low humidity within a filling machine during the contemplated steps of rectifying and assembling. In certain embodiments, the primary capsule may contain moisture content in the range of approximately 0% to 6% of the total weight. Similarly, a secondary capsule, a tertiary capsule, etc. may be processed in the same manner as the primary capsule relative to conditions of low humidity during the steps of rectifying and assembling. As contemplated herein, a moisture content of approximately 0% to 3% by weight is preferable. However, capsules having a higher moisture content than those stated herein are certainly not outside the spirit and scope of the present invention.

As illustrated in FIGS. **1-9** and **11-13**, the shape of the base and corresponding cap of the capsules (e.g., primary, secondary, tertiary, etc.) of the presently preferred embodiments of the multi-compartment capsules are configured having a general cylindrical shape which defines a diameter and length sufficient for the introduction of an internal smaller capsule or one or more dividing walls along the length of the capsular base. It is apparent that other geometrical configurations of the cap are likewise suitable and contemplated herein, such as the general U-shaped configuration of the cap shown in FIG. **10**. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to any particular structure or configuration for implementing those principles.

In one presently preferred embodiment, the clearance between the primary capsule and the secondary capsule introduced within the internal periphery of the primary capsule is preferably greater than +0.2 mm. The clearance between the outer capsular walls of the secondary capsule and the inner capsular walls of the primary capsule (or the tertiary capsule and the secondary capsule) may be in the range of about 0 mm to 0.5 mm, whereas the outer capsular walls of the secondary capsule or tertiary capsule may be in actual contact with the inner capsular walls of the primary capsule or secondary capsule, respectively. As appreciated, in an effort to structural facilitate independent receiving chambers on opposing sides of a dividing wall introduced within the internal periphery of a base of a capsule, the perimeter of the dividing wall preferably engages the inner capsular walls of the capsule to provide a sealing relationship there between.

As further contemplated herein, the inner capsular walls of a primary capsule may be treated with an adhesive sufficient to improve engagement between the primary capsule and the outer capsular walls of a secondary capsule. A suitable technique to apply an adhesive may be by way of spraying the same on the shells and capsules immediately before assembling the same. Suitable adhesives that may be used may include, for example, tackidex, an aqueous gelatin solution, or the like.

The primary, secondary or tertiary capsules, in accordance with the present invention, may be formed having the same or different colors. Moreover, the base and corresponding cap of a single capsule may be formed having different colors in an effort to enhance the aesthetics of the capsule to the consumer. In one presently preferred embodiment of a multi-compartment capsule of the present invention, the dosage may be banded, sealed or easily dividable in a contact area of the primary and secondary capsules or the sealing band may be color-coded to assist in branding, if desired.

It is further contemplated herein that a multi-compartment capsule of the present invention may comprise component parts of the capsule having various time-release coatings to facilitate the release and ultimately the absorption of those active ingredients introduced into the different receiving chambers of the multi-compartment capsule to release at different release rates. In particular, a primary capsule may be formed having a conventional time-release coating that dissolves and releases the active ingredient(s) contained therein before the timed-release of the active ingredient(s) contained within a secondary capsule. Likewise, the dividing walls disposed within the internal periphery of the base of a capsule may be formed having conventional time-release coatings that dissolve and release the active ingredients within each receiving chamber defined by the dividing walls at different rates, thereby delivering the active ingredients or medicaments contained within a multi-compartment capsule at different rates. Certain active ingredients or medicaments may, therefore, be delivered at a selected interval, while other ingredients may be released at a later interval. In this way, the novel design of the multi-compartment capsules of the present invention may facilitate precision delivery of active ingredients to targeted areas of the consumer.

The disclosure of secondary and tertiary capsules may be replaced with other forms of microencapsulation. Microencapsulation as previously described, refers to the process whereby minute parcels of a solid, liquid, gas or dispersion, introduced into one or more of the receiving chambers as active ingredient(s), are film-coated with a secondary material in order to shield the active ingredient from its surrounding environment. Microcapsules may measure from microns to several millimeters, whereas the main purpose being to facilitate the release of the active ingredients at different release rates.

The incorporation of time-release coatings to varying the release rates of the active ingredients of a multi-compartment capsule may be used to target key time intervals or events when the body may be most able to utilize the active ingre-

dients. In one presently preferred embodiment of the present invention, all of the active ingredients may be microencapsulated. In alternate presently preferred embodiments, only selected ingredients may be microencapsulated for delayed release, while other ingredients may be provided for immediate absorption. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment.

As contemplated herein, the physical states of active ingredients are characterized into one of four different states (e.g., solid, liquid, gas or dispersion). These four different states are sometimes referred to as "phases" (i.e., solid phase, liquid phase, gas phase or dispersion phase). For purposes of the present invention, the term "solid" is defined as including, by way of example only and not by way of limitation, pills, tablets, capsules (including both hard and soft elastic), powders, granulation, flakes, troches (lozenges and pastilles), suppositories and semi-solid pastes, ointments, emulsions or creams. The term "liquid" is defined as including, by way of example only and not by way of limitation, solutions, spirits, elixirs, sprays, syrups or fluid extracts. The term "dispersion" is defined as including, by way of example only and not by way of limitation, aerosols (liquid or solid in gas), suspensions (solid in liquid), emulsions (liquid in liquid), foams (gas in liquid), solid foams (solid in gas) or gels (liquid or solid in solid).

The active ingredients or medicaments introduced into the receiving chambers of the multi-compartment capsules of the present invention preferably comprise a pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof. For purposes of the present invention, the term "pharmaceutical" is defined as any substance that affects the structure or functioning of a living organism. Pharmaceuticals, sometimes referred to as "drugs" are widely used for the prevention, diagnosis and treatment of diseases and for the relief of symptoms. The term "biotechnical" is defined as any substance that is derived from a biotechnology process. Biotechnology, sometimes shortened to "biotech", is the development of techniques and methods (e.g., genetic engineering, protein engineering genomics, proteomics, monoclonal antibody production, polymerase chain reaction, transgenics and the like) for the application of biological processes to the production of materials of use in medicine, foods, nutrition and industry. The term "nutraceutical" is defined as any substance that is a food of a part of a food and provides medical or health benefits, including the prevention and treatment of disease. The term "vitamin" is defined as any of various organic substances or compounds that are essential for the normal processes of growth and maintenance (e.g., essential for energy transformation and regulation of metabolism) of the body which are present in natural foodstuffs or sometimes produced within the body. The term "dietary supplement" is defined as any product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following dietary ingredients: (A) a vitamin; (B) a mineral; (C) an herb or other botanical; (D) an amino acid; (E) a dietary substance for supplementing the diet by increasing the total dietary intake; or (F) a concentrate, metabolite, constituent, extract or combination of any ingredient described in (A), (B), (C), (D), or (E) hereinabove. If desired, excipients may also be introduced into one or more of the receiving chambers of the multi-compartment capsules of the present invention in addition to the active ingredient(s). For example, in some cases involving medicaments with poor water solubility, it may be desirous to stabilize the liquids, solids or dispersions using a lipid, lipoid, lecithin, ghee or the like. Still further by example, in some cases involving active ingredients or medicaments with poor bioavailability, bioequivalence, or other undesirous pharmaceutical properties (e.g., poor water solubility, pH lability, physical incompatibility, chemical incompatibility, macromolecular size and the like) such as proteins (e.g., hormones, erythropoeitins, colony stimulating factors, interferons, interleukins, plasminogen activators, monoclonal antibodies, vaccines, plant proteins, such as soy and other therapeutic proteins) or other non-polar or weak-polar materials, it may be desirous to complement the active ingredient or medicament in liquid, solid or dispersion form using a fat, lipid, lipoid, lecithin, ghee, polymers, viral and bacterial vectors and the like.

It may be demonstrated that as medical and pharmacy knowledge has continued to expand exponentially, new medicaments, new classes of medicaments and new delivery technologies are becoming available for use in animals and humans who experience particular medical diseases, illnesses or conditions. A disease, illness, or condition may affect one or more organ systems in an animal or human. Organ systems may include, for example: (1) autonomic, (2) cardiovascular, (3) neurological, (4) gastro-intestinal, (5) respiratory, (6) renal system, (7) psychiatric, (8) endocrine, (9) gynecologic, (10) urologic, (11) immunologic, (12) bone and joint systems, (13) ear, nose, and throat, (14) dermatologic, (15) hematologic, (16) infectious defense and (17) nutrition and metabolism. In an animal or human who may be suffering from one disease, illness or condition, it is common to also be suffering from a disease, illness or condition affecting one or more of the other organ system(s). These concomitant diseases, illnesses or conditions occurring within a single animal or human are often labeled as "co-morbidities," a term often shortened and referred to as "co-morbid."

New medicaments and delivery technologies are providing patients and their health care practitioners with unprecedented therapeutic options in managing diseases, illnesses and conditions. In spite of this sophistication, there has been no effort to develop new methods of using fixed combinations of medicaments for therapy of co-morbid diseases, illnesses or conditions. Moreover, there has been no effort to develop new methods of using fixed combinations of medicaments for management of a single disease, illness or condition affecting one or more organ system(s). The aforementioned fixed combinations may include a plurality of medicaments, which may be newly discovered and developed, or have been known for sometime or some combination of medicaments thereof. In any regard, said fixed combinations have not previously been contemplated in the art.

The following examples will illustrate the invention in further detail. It will be readily understood that the various active ingredients or medicaments that may be introduced into the receiving chambers of the multi-compartment capsules of the present invention, as generally described and illustrated in the Examples herein, are to be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or process for implementing those principles. Thus, the following more detailed description of the presently preferred embodiments of the methods, formulations, and compositions of the present invention, as represented in Examples I-XIV below, is not intended to limit the scope of the invention, as claimed, but is merely representative of presently preferred embodiments of the invention.

Example I

Glucosamine/Chondroitin (Solid) & Vitamin E (Liquid)

As appreciated by those skilled in the art, arthritis is an inflammatory condition typically affecting the synovia membranes and cartilage of joints. It has been estimated that as many as one in three persons may experience symptoms associated with arthritis during their lifetime.

In addition to arthritis, various other chronic, debilitating conditions may afflict the aged. Many of these conditions result from the natural process of aging in humans. The natural aging process is partially due to the accumulation and effects of toxic free-radical chemicals. Free-radicals result from several homeostatic biochemical processes. It is, accordingly, desirable to develop nutraceutical or dietary supplement products which may alleviate multiple chronic, debilitating conditions. It is also desirable to package and administer such products in the most economic and convenient possible fashion.

The administration of glucosamine, a naturally occurring substance in mucopoly-saccharides, mucoproteins and chitin, is believed to promote the production of cartilage components and the repair of damaged cartilage. Clinical findings support that fibroblast cells increased production of mucopolysaccharide and collagen synthesis when glucosamine was added.

Chondroitin sulfates are large polymers of glycosaminoglycans, primarily D-glucuronic acid and D-acetylgalactosamine, and disaccharides and may be derived from the cartilage of bovine trachea. The administration of chondroitin sulfate has been shown to promote the formation of new cartilage matrix. In particular, chondroitin stimulates the metabolism of chondrocyte cells and the production of collagen and proteoglycan.

Vitamin E, also known as alpha-tocopherol, is a well-known scavenger of free-radicals in the body. Free-radical scavengers are sometimes referred to as anti-oxidants. This scavenging process is important for detoxifying the body of chemicals which are known to promote apoptosis, or programmed cell death. Apoptosis is a scientific description of cellular destruction. Although vitamin E is a popular anti-oxidant, it is poorly soluble in water and thus can be administered only as a liquid-oil formulation or in an oil formulation enclosed in a soft elastic capsule.

In one presently preferred embodiment of the present invention, therapeutically effective amounts of glucosamine, chondroitin, and vitamin E (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein at least two of the active ingredients have physical states (e.g., solid, liquid, gas or dispersion) that differ. Consistent with the foregoing, multi-compartment, multi-phase capsules and encapsulation technology are herein contemplated to produce a delivery vehicle for delivering anti-arthritic and anti-oxidant compounds to the body in a single dosage. A capsular format of the present invention may include the following composition:

Primary Capsule:	
Glucosamine HCl [500-2000 mg/day]	500 mg
Chondroitin sulfate [400-1600 mg/day]	400 mg
Secondary Capsule:	
Vitamin E [200-400 IU/day]	200 IU

The incorporation of time-release coatings to varying the release rates of the active ingredients (e.g., glucosamine HCl/chondroitin sulfate and vitamin E) in the primary and secondary capsules, respectively, of the multi-compartment capsule may be used to target key time intervals or events when the body may be most able to utilize the named active ingredients. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment.

A therapeutically effective amount of glucosamine HCl/chondroitin sulfate may be introduced into at least a portion of the internal periphery of the receiving chambers of a primary capsule in the form of a solid and a therapeutically effective amount of vitamin E may be introduced into at least a portion of a secondary capsule in the form of a liquid, if desired. Since the encapsulation process and multi-compartment, multi-phase capsule of the present invention are configured to apply to an anticipated treatment regime or medicinal design of a single dosage capsule, it will be readily appreciated that the introduction of one or more active ingredients into the receiving chambers of the primary and secondary capsules, respectively, is anticipated such that the various ingredients may be introduced in different receiving chambers to accommodate different treatment modalities. For example, a multi-compartment capsule may be formulated having glucosamine HCl and chondroitin sulfate introduced into the receiving chambers of the secondary capsule and vitamin E may be introduced into the receiving chamber of the primary capsule. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Example II

S-Adenosylmethione (SAMe) (Solid) & Vitamin E (Liquid)

S-adenosylmethione (SAMe), may be derived from two materials: methionine, a sulfur-containing amino acid, and adenosine triphosphate (ATP), the body's main energy compound. SAMe was originally developed around 1950 as an antidepressant. Over the years, it has also been found that SAMe may assist in alleviating arthritic symptoms, assist in the manufacture of melatonin, which is needed to regulate sleep, help protect DNA from harmful mutations and prevent certain types of nerve damage.

As noted above, vitamin E is a popular anti-oxidant, but it is poorly soluble in water and therefore can be administered only as a liquid-oil formulation. Vitamin E is typically measured in international units (IU) of alpha tocopherol.

In one presently preferred embodiment of the present invention, therapeutically effective amounts of SAMe and vitamin E (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein SAMe comprises a physical state (e.g. solid, liquid, gas or dispersion) different from the physical state of vitamin E. As shown in FIGS. **3** and **4**, a therapeutically effective amount of SAMe may be introduced into receiving chamber **218***a* and a thera-

peutically effective amount of vitamin E may be introduced into receiving chamber **218***b* of a multi-compartment capsule **210** of the present invention. Consistent with the foregoing, multi-compartment, multi-phase capsules and encapsulation technology are herein contemplated to produce a delivery vehicle for delivering mood enhancing, anti-arthritic and anti-oxidant compounds to the body in a single dosage. A capsular format of the present invention may include the following composition:

Receiving Chamber (218a):	
S-adenosylmethione [200-1600 mg/day]	1000 mg
Receiving Chamber (218b):	
Vitamin E [200-400 IU/day]	200 IU

The incorporation of time-release coatings to varying the release rates of the active ingredients (e.g., SAMe and vitamin E) of the multi-compartment capsule **210** may be used to target key time intervals or events when the body may be most able to utilize the named active ingredients. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment.

According to one presently preferred embodiment of the present invention, a therapeutically effective amount of SAMe may be introduced into at least a portion of the receiving chamber **218***a* in the form of a solid and a therapeutically effective amount of vitamin E may be introduced into at least a portion of the receiving chamber **218***b* of the primary capsule **211** in the form of a liquid.

In an alternative presently preferred embodiment of the present invention, therapeutically effective amounts of SAMe and vitamin E (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein SAMe comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of vitamin E. As shown in FIG. **2**, a therapeutically effective amount of SAMe, in the form of a solid, may be introduced into receiving chamber **118** and **138** and a therapeutically effective amount of vitamin E, in the form of a liquid, may be introduced into receiving chamber **128** of a multi-compartment capsule **110** of the present invention. The material forming the primary capsule shell **111** may be formulated in a manner allowing for immediate dissolution and release of the of the contents of receiving chamber **118**. The material forming the secondary capsule shell **120** may be formulated in a manner allowing for either an immediate dissolution or a time-delayed dissolution and release of the contents of receiving chamber **128**. The material forming the tertiary capsule shell **138** may be formulated in a manner allowing for time-delayed dissolution and release of the contents of receiving chamber **138**. In this presently preferred embodiment of the present invention, a total daily dosage of SAMe may be delivered as two separate dosages within a single oral dosage form. One presently preferred embodiment of the present invention thus makes for a more convenient dosage form.

Since the encapsulation process and multi-compartment, multi-phase capsule of the present invention are configured to apply to an anticipated treatment regime or medicinal design of a single dosage capsule, it will be readily appreciated that the introduction of one or more active ingredients into receiving chambers defined within a capsule is anticipated such that the various ingredients may be introduced in different receiving chambers to accommodate different treatment modalities. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Example III

Curcumin, Holy Basil, Zinc (Solid) & Fish Oil (Omega 3 Fatty Acids DHA & EPA-Liquid)

Curcumin belong to a class of compounds derived from the turmeric root and is a yellow-orange volatile oil. It is believed that curcumin has an inhibitory effect on carcinogenesis, which is the evolution of a normal cell into a cancerous cell. There is clinical evidence to suggest curcumin may help to prevent stomach, colon, oral, esophageal, breast and skin cancers. Additional studies have been conducted to show that curcumin may be helpful in balancing cholesterol levels, protecting against ulcers by inhibition of gastric acid secretion and protection of gastric mucosal tissue, and anti-inflammatory actions. In one clinical study, curcumin was found to be as effective as non-steroidal anti-inflammatory drugs in the treatment of arthritis and lost-operative pain.

The administration of Holy Basil (*Ocimum sanctum*) has been shown to have an effect on promoting peripherally mediated analgesic effects. This action allows a broad range of therapeutic effects, including, anti-inflammatory, hypoglycemia, analgesic, anti-ulcer and anti-septic properties.

As known, zinc is a mineral that occurs in animal and plant tissues and is an important co-factor for various enzyme reactions in the body, as well as being helpful for the reproduction system, and for the manufacture of body proteins. Zinc is also an antioxidant nutrient, similar to vitamin E. There is clinical data that suggests that zinc may be important to the prostate and other reproductive organs in the body, may help in the contractility of muscles, help stabilize blood, help maintain the body's alkaline balance and aid in the digestion and metabolism of phosphorus.

Over several decades considerable evidence has been collected to suggest that fish and fish oils are beneficial to the heart, mental health and in reducing cancer risk. The "active" components of fish oils are eicosapentaenoic acid (EPA), a polyunsaturated fatty acid with a 20 carbon chain, and docosahexaenoic acid (DHA), a polyunsaturated fatty acid with a 22 carbon chain. Both active components are members of the omega-3 group of essential fatty acids and are found exclusively in marine animals. The best sources for EPA and DH A may be fatty fish such as herring, sardines, salmon and fresh tuna.

The recommended daily intake of EPA plus DHA is between 650 to 1000 mg/day. Clinical trials have used anywhere from 1 g/day to 10 g/day, but little additional benefit has been observed at levels above 5 g/day of EPA and DHA combined. The onset of beneficial effects is variable. Effects on cholesterol may occur in just a few weeks, but it may take there (3) months or longer to see effects in degenerative diseases, such as arthritis.

In one presently preferred embodiment of the present invention, therapeutically effective amounts of curcumin, Holy Basil, zinc and fish oil (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein curcumin. Holy Basil and zinc comprise a physical state (e.g. solid, liquid, gas or dispersion) different from the physical state of the fish oil. As shown in FIG. **2**, a

therapeutically effective amount of curcumin may be introduced into receiving chamber **138** of a tertiary capsule **130**, a therapeutically effective amount of Holy Basil and zinc may be introduced into receiving chamber **128** of a secondary capsule and a therapeutically effective amount of fish oil may be introduced into receiving chamber **118** of a primary capsule **111** of a multi-compartment capsule **110** of the present invention. Consistent with the foregoing, multi-compartment, multi-phase capsules and encapsulation technology are herein contemplated to produce a delivery vehicle for delivering anti-neoplastic, anti-inflammatory, analgesic and anti-oxidant compounds to the body in a single dosage. A capsular format of the present invention may include the following composition:

Tertiary Capsule (130):	
Curcumin [1200-1800 mg/day; 400 mg three times daily]	400 mg
Secondary Capsule: (120):	
Holy Basil [2.5 grams fresh dried leaf powder/day]	2.5 gms
Zinc [4-15 mg/day]	15 mg
Primary Capsule (111):	
Fish oil (Omega 3 fatty acids-DHA & EPA) [650-1000 mg/day]	1000 mg

The incorporation of time-release coatings to varying the release rates of the active ingredients (e.g., curcumin, Holy Basil, Zinc and fish oil) in the primary, secondary and tertiary capsules **111**, **120**, **130** of one presently preferred embodiment of a multi-compartment capsule **110** may be used to target key time intervals or events when the body may be most able to utilize the named active ingredients. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment.

As contemplated herein, a therapeutically effective amount of curcumin may be introduced into at least a portion of the receiving chamber **138** of the tertiary capsule **130** in the form of a solid, a therapeutically effective amount of Holy Basil and zinc may be introduced into at least a portion of the receiving chamber **128** of the secondary capsule **120** in the form of a solid and a therapeutically effective amount of fish oil may be introduced into at least a portion of the primary capsule **111** in the form of a liquid. Since the encapsulation process and multi-compartment, multi-phase capsule of the present invention are configured to apply to an anticipated treatment regime or medicinal design of a single dosage capsule, it will be readily appreciated that the introduction of one or more active ingredients into the receiving chambers of the primary and secondary capsules, respectively, is anticipated such that the various ingredients may be introduced in different receiving chambers to accommodate different treatment modalities. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Example IV

Vitamin C (Solid) & Vitamin E (Liquid)

It is believed that vitamin C plays an important role as a component of enzymes involved in the synthesis of collagen and carnitine. A vital role of vitamin C, however, is believed to be that of the primary, water-soluble antioxidant in the human body. A daily intake of 6-1000 mg of vitamin C may be adequate for preventive purposes, but far larger quantities may be required to have an effect on halting or reversing cancer and heart disease.

As noted above, vitamin E is a popular anti-oxidant, but it is poorly soluble in water and therefore can be administered only as a liquid-oil formulation.

In one presently preferred embodiment of the present invention, therapeutically effective amounts of vitamin C and vitamin E (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein vitamin C comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of vitamin E. Consistent with the foregoing, multi-compartment, multi-phase capsules and encapsulation technology are contemplated herein to produce a delivery vehicle for delivering anti-oxidant compounds to the body in a single dosage. A capsular format of the present invention may include the following composition:

Primary Capsule:	
Vitamin C [60-1000 mg/day]	500 mg
Secondary Capsule:	
Vitamin E [200-400 IU/day]	200 IU

The incorporation of time-release coatings to varying the release rates of the active ingredients (e.g., vitamin C and vitamin E) in different receiving chambers of a multi-compartment capsule may be used to target key time intervals or events when the body may be most able to utilize the named active ingredients. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment and is contemplated herein.

A therapeutically effective amount of vitamin C may be introduced into at least a portion of a first receiving chamber in the form of a solid and a therapeutically effective amount of vitamin E may be introduced into at least a portion of a second receiving chamber in the form of a liquid. Since the encapsulation process and multi-compartment, multi-phase capsule of the present invention are configured to apply to an anticipated treatment regime or medicinal design of a single dosage capsule, it will be readily appreciated that the introduction of one or more active ingredients into the receiving chambers of the primary and secondary capsules, respectively, is anticipated such that the various ingredients may be introduced in different receiving chambers to accommodate different treatment modalities. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Example V

Selenium/Vitamin C (Solid) & Vitamin E/Beta-Carotene/Fish Oil (Omega 3 Fatty Acids DHA & EPA) (Liquid)

Selenium is an essential trace mineral in the human body and an important part of antioxidant enzymes that protect

cells against the effects of free radicals that are produced during normal oxygen metabolism. As readily known in the art, the body has developed defenses, such as antioxidants, to assist in controlling levels of free radicals which can cause damage to cells and contribute to the development of some chronic diseases. It is also believed that Selenium is essential for normal functioning of the immune system and thyroid gland. The recommended dietary allowance for selenium is 55 mcg/day.

As noted above, it is believed that vitamin C plays an important role as a component of enzymes involved in the synthesis of collagen and carnitine and a vital role as a water soluble antioxidant in the human body. Vitamin E is another important anti-oxidant.

Beta-carotene is a substance found in plants that the body converts into vitamin A. It is believed that beta-carotene acts as an antioxidant and an immune system booster. There is no RDA for beta-carotene. The most common beta-carotene supplement intake is about 25,000 IU (15 mg) per day, however supplementation with as much as 100,000 IU (60 mg) per day has been reported.

It has been suggested that fish and fish oils are beneficial to the heart, mental health and in reducing cancer risk. The recommended daily intake of EPA plus DHA (the active components of fish oil) is between 650 to 1000 mg/day. Clinical trials have used anywhere from 1 g/day to 10 g/day, but little additional benefit has been observed at levels above 5 g/day of EPA and DHA combined.

In one presently preferred embodiment of the present invention, therapeutically effective amounts of selenium, vitamin C, beta-carotene, vitamin E and fish oil (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein selenium and vitamin C comprise a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of vitamin E, beta-carotene and fish oil (omega 3 fatty acids DHA & EPA). Specifically, a therapeutically effective amount of selenium and vitamin C may be introduced into one or more receiving chambers of a primary capsule and a therapeutically effective amount of vitamin E, beta-carotene and fish oil (omega 3 fatty acids DHA & EPA) may be introduced into one or more receiving chambers of a secondary capsule to form a multi-compartment capsule of the present invention. Consistent with the foregoing, multi-compartment, multi-phase capsules and encapsulation technology are herein contemplated to produce a delivery vehicle for delivering anti-oxidant compounds to the body in a single dosage. A capsular format of the present invention may include the following composition:

Primary Capsule:	
Selenium [50-100 mcg/day]	50 mcg
Vitamin C [60-1000 mg/day]	500 mg
Secondary Capsule:	
Beta-carotene [30-300 mg/day]	50 mg
Vitamin E [200-400 IU/day]	200 IU
Fish oil (Omega 3 fatty acids-DHA & EPA) [650-1000 mg/day]	1000 mg

The incorporation of time-release coatings to varying the release rates of the active ingredients (e.g., selenium, vitamin C, vitamin E, beta carotene and fish oil) in different receiving chambers of a multi-compartment capsule may be used to target key time intervals or events when the body may be most able to utilize the named active ingredients. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment and is contemplated herein.

A therapeutically effective amount of selenium and vitamin C may be introduced into one or more receiving chambers of a primary capsule in solid form and a therapeutically effective amount of vitamin E, beta carotene and fish oil may be introduced into one or more receiving chambers of a secondary capsule in the form of a liquid. Since the encapsulation process and multi-compartment, multi-phase capsule of the present invention are configured to apply to an anticipated treatment regime or medicinal design of a single dosage capsule, it will be readily appreciated that the introduction of one or more active ingredients into the receiving chambers of the primary and secondary capsules, respectively, is anticipated such that the various ingredients may be introduced in different receiving chambers to accommodate different treatment modalities. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Example VI

Fluoxetine (Solid), S-Adenosylmethione (SAMe) (Solid) & Vitamin E (Liquid)

As appreciated by those skilled in the art, depression is a mental state characterized by excessive sadness. Depression is one of several forms of mood disorders. Activity in those affected with depression may be agitated and restless or slow and retarded. Those affected may also show pessimistic or despairing behavior and may have disturbances in sleep, appetite and concentration. Depression is often a co-morbid condition with other chronic disease states involving the neurological system, cardiovascular system, respiratory system, endocrine system, musculoskeletal system, immune system, genitourinary system and the like. This list is should not be considered exclusive.

Administration of Fluoxetine is known by those of skill in the art to alleviate the signs and symptoms of depression. Fluoxetine belongs to a class of compounds which are given the functional name: selective serotonin reuptake inhibitors (SSRI's). This class may include, for example: fluoxetine (PROZAC®), sertraline (ZOLOFT®), paroxetine (PAXIL®), fluvoxamine (LUVOX®), citalopram (CELEXA®) and escitalopram (LEXAPRO®). As appreciated, the foregoing list is provided herein as exemplary and should not be considered exclusive or exhaustive.

Fluoxetine is a bicyclic compound, similar in structure to phenylpropanolamine. Fluoxetine structure imparts a high selectivity for interaction with cells of the nervous system for the function of preventing the reuptake of serotonin into presynaptic cell storage sites. This action leads to marked increases in synaptic concentration of serotonin and is facilitative of numerous physiological processes requiring serotonin neurotransmission. In the pharmaceutical field Fluoxetine is available as a hydrochloride salt (HCl).

S-adenosylmethione (SAMe), is derived from two materials: methionine, a sulfur-containing amino acid, and adenosine triphosphate (ATP), the body's main energy compound. SAMe was originally developed around 1950 as an antide-

pressant, but it was also found to be helpful in the alleviation of arthritic symptoms. SAMe is essential for the manufacture of melatonin, which is needed to regulate sleep. It also helps to protect DNA from harmful mutations and may help prevent certain types of nerve damage. Current clinical research is beginning to confirm these antidepressant qualities of SAMe.

Vitamin E, also named alpha-tocopherol, is a well-known scavenger of free-radicals in the body. Free-radical scavengers are sometimes referred to as anti-oxidants. This scavenging process is important for detoxifying the body of chemicals which are known to promote apoptosis, or programmed cell death. Apoptosis is a scientific description of cellular destruction. Although it is a popular anti-oxidant, Vitamin E is poorly soluble in water and thus can be administered only as a liquid-oil formulation or in an oil formulation enclosed in a soft elastic capsule. Vitamin E is typically measured in international units (IU) of alpha tocopherol.

In one presently preferred embodiment of the present invention, therapeutically effective amounts of Fluoxetine, SAMe and Vitamin E (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein Fluoxetine and SAMe comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of Vitamin E. As shown in FIGS. **3** and **4**, a therapeutically effective amount of Fluoxetine and SAMe may be introduced into receiving chamber **218***a* and a therapeutically effective amount of Vitamin E may be introduced into receiving chamber **218***b* of a multi-compartment capsule **210** of the present invention. Consistent with the foregoing, multi-compartment, multi-phase capsules and encapsulation technology are herein contemplated to produce a delivery vehicle for delivering mood enhancing, anti-depressant and anti-oxidant compounds to the body in a single dosage. A capsular format of the present invention may include the following composition:

Receiving Chamber (218a):	
Fluoxetine [20-60 mg/day]	20 mg
S-adenosylmethione [200-1600 mg/day]	1000 mg
Receiving Chamber (218b):	
Vitamin E [200-400 IU/day]	200 IU

The incorporation of time-release coatings to varying the release rates of the active ingredients (e.g., Fluoxetine/SAMe and Vitamin E) in the primary and secondary capsules, respectively, of the multi-compartment capsule may be used to target key time intervals or events when the body may be most able to utilize the named active ingredients. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment.

According to one presently preferred embodiment of the present invention, a therapeutically effective amount of Fluoxetine and SAMe may be introduced into at least a portion of the receiving chamber **218***a* in the form of a solid and a therapeutically effective amount of Vitamin E may be introduced into at least a portion of the receiving chamber **218***b* of the primary capsule **211** in the form of a liquid.

In an alternative presently preferred embodiment of the present invention, therapeutically effective amounts of Fluoxetine and SAMe and Vitamin E (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein Fluoxetine and SAMe comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of Vitamin E. As shown in FIG. **2**, a therapeutically effective amount of Fluoxetine and SAMe, in the form of a solid, may be introduced into receiving chamber **118** and **138** and a therapeutically effective amount of Vitamin E, in the form of a liquid, may be introduced into receiving chamber **128** of a multi-compartment capsule **110** of the present invention. The material forming the primary capsule shell **111** may be formulated in a manner allowing for immediate dissolution and release of the of the contents of receiving chamber **118**. The material forming the secondary capsule shell **120** may be formulated in a manner allowing for either an immediate dissolution or a time-delayed dissolution and release of the contents of receiving chamber **128**. The material forming the tertiary capsule shell **138** may be formulated in a manner allowing for time-delayed dissolution and release of the contents of receiving chamber **138**. In this presently preferred embodiment of the present invention, a total daily dosage of Fluoxetine and SAMe may be delivered as two separate dosages within a single oral dosage form. One presently preferred embodiment of the present invention thus makes for a more convenient dosage form.

Since the encapsulation process and multi-compartment, multi-phase capsule of the present invention are configured to apply to an anticipated treatment regime or medicinal design of a single dosage capsule, it will be readily appreciated that the introduction of one or more active ingredients into the receiving chambers of the primary and secondary capsules, respectively, is anticipated such that the various ingredients may be introduced in different receiving chambers to accommodate different treatment modalities. For example, a multi-compartment capsule may be formulated having Fluoxetine and SAMe introduced into the receiving chambers of the secondary capsule and Vitamin E may be introduced into the receiving chamber of the primary capsule. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Example VII

Rofecoxib (Solid) & Vitamin E (Liquid)

As appreciated by those skilled in the art, arthritis is an inflammatory condition typically affecting the synovia and cartilage of joints. It has been estimated that as many as one in three persons may experience symptoms associated with arthritis during their lifetime.

In addition to arthritis, various other chronic, debilitating conditions may afflict the aged. Many of these conditions result from the natural process of aging in humans. The natural aging process is partially due to the accumulation and effects of toxic free-radical chemicals. Free-radicals result from several homeostatic biochemical processes. It is, accordingly, desirable to develop pharmaceutical, biotechnical, nutraceutical or dietary supplement products which may alleviate multiple chronic, debilitating conditions. It is also desirable to package and administer such products in the most economic and convenient possible fashion.

Anti-inflammatory agents may have many diverse therapeutic roles in the human body. Inflammation is the process undertaken by the body as it responds to an injury. A typical inflammatory response involves blood vessel dilation,

increased blood flow to the site of injury, and influx of white blood cells to process and remove dead tissue. Inflammation can lead to pain and swelling at the site of injury. Medicaments used in modulating the inflammatory response may be divided into steroid and non-steroidal labels. The latter is more commonly identified as non-steroidal anti-inflammatory drugs (NSAIDs).

Rofecoxib belongs to a class of NSAID compounds given the functional name cyclo-oxygenase-2 ("COX-2") inhibitors. This class may include, for example: rofecoxib (VIOXX®), celecoxib (CELEBREX®), valdecoxib (BEXTRA®), and meloxicam (MOBIC®). As appreciated, the foregoing list is provided herein as exemplary and should not be considered exclusive or exhaustive.

Rofecoxib is presently believed to inhibit the action of COX-2, an enzyme involved in the production of prostaglandins in the human body. Prostaglandins serve many diverse roles, one of which is to stimulate an inflammation mechanism in immune responses. Recently, Rofecoxib was labeled for use in the treatment of osteoarthritis, rheumatoid arthritis, acute pain, and primary dysmenorrhea.

Vitamin E, also named alpha-tocopherol, is a well-known scavenger of free-radicals in the body. Free-radical scavengers are sometimes referred to as anti-oxidants. This scavenging process is important for detoxifying the body of chemicals which are known to promote apoptosis, or programmed cell death. Apoptosis is a scientific description of cellular destruction. Although it is a popular anti-oxidant, Vitamin E is poorly soluble in water and thus can be administered only as a liquid-oil formulation or in an oil formulation enclosed in a soft elastic capsule.

In one presently preferred embodiment of the present invention, therapeutically effective amounts of Rofecoxib and Vitamin E (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein Rofecoxib comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of Vitamin E. As shown in FIGS. **3** and **4**, a therapeutically effective amount of Rofecoxib may be introduced into receiving chamber **218***a* and a therapeutically effective amount of Vitamin E may be introduced into receiving chamber **218***b* of a multi-compartment capsule **210** of the present invention. Consistent with the foregoing, multi-compartment, multi-phase capsules and encapsulation technology are herein contemplated to produce a delivery vehicle for delivering anti-inflammatory and anti-oxidant compounds to the body in a single dosage. A capsular format of the present invention may include the following composition:

Receiving Chamber (218a):	
Rofecoxib [12.5-25 mg/day]	25 mg
Receiving Chamber (218b):	
Vitamin E [200-400 IU/day]	200 IU

The incorporation of time-release coatings to varying the release rates of the active ingredients (e.g., Rofecoxib and Vitamin E) of the multi-compartment capsule **210** may be used to target key time intervals or events when the body may be most able to utilize the named active ingredients. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment.

According to one presently preferred embodiment of the present invention, a therapeutically effective amount of Rofecoxib may be introduced into at least a portion of the receiving chamber **218***a* in the form of a solid and a therapeutically effective amount of Vitamin E may be introduced into at least a portion of the receiving chamber **218***b* of the primary capsule **211** in the form of a liquid.

In an alternative presently preferred embodiment of the present invention, therapeutically effective amounts of Rofecoxib and Vitamin E (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein Rofecoxib comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of Vitamin E. As shown in FIG. **2**, a therapeutically effective amount of Rofecoxib, in the form of a solid, may be introduced into receiving chamber **118** and **138** and a therapeutically effective amount of Vitamin E, in the form of a liquid, may be introduced into receiving chamber **128** of a multi-compartment capsule **110** of the present invention. The material forming the primary capsule shell **111** may be formulated in a manner allowing for immediate dissolution and release of the of the contents of receiving chamber **118**. The material forming the secondary capsule shell **120** may be formulated in a manner allowing for either an immediate dissolution or a time-delayed dissolution and release of the contents of receiving chamber **128**. The material forming the tertiary capsule shell **138** may be formulated in a manner allowing for time-delayed dissolution and release of the contents of receiving chamber **138**. In this presently preferred embodiment of the present invention, a total daily dosage of Rofecoxib may be delivered as two separate dosages within a single oral dosage form. One presently preferred embodiment of the present invention thus makes for a more convenient dosage form.

Since the encapsulation process and multi-compartment, multi-phase capsule of the present invention are configured to apply to an anticipated treatment regime or medicinal design of a single dosage capsule, it will be readily appreciated that the introduction of one or more active ingredients into receiving chambers defined within a capsule is anticipated such that the various ingredients may be introduced in different receiving chambers to accommodate different treatment modalities. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Example VIII

Diphenhydramine Hydrochloride (Solid) & Vitamin E (Liquid)

As appreciated by those skilled in the art, allergic reactions are conditions wherein the immune system is stimulated to identify, segregate and dispose of exogenous chemicals which cannot be recognized by the body. Allergic reactions are often associated with the release of histamine, a chemical compound which produces changes in the permeability of blood vessels and the accumulation of other immune system cells. In some circumstances, it may be desirable to modulate the amount of allergic response that is capable of being generated by the immune system.

Diphenhydramine belongs to a class of compounds which are given the functional name: histamine-1 (H_1) receptor antagonists. These compounds are more generally labeled as

antihistamines. These antagonists are further divided according to their chemical structures. Diphenhydramine is an ethanolamine (aminoalkyl ether) derivative. Other chemical divisions may include, for example: ethylenediamine, propylamine, phenothiazine, piperazine. The ethanolamine division may include, for example: diphenhydramine, clemastine, dimenhydrinate, and doxylamine. As appreciated, the foregoing list is provided herein as exemplary and should not be considered exclusive or exhaustive.

Antihistamines block the interaction of the neurotransmitter, histamine, with H_1 receptors located in smooth muscle linings of the gastrointestinal tract, bronchial tract and large blood vessels. This blocking action may lead to marked relaxation in smooth muscle tone and is facilitative of numerous physiological processes including respiration.

The H_1 antagonists may also be divided according to their selectivity for central and peripheral HI receptors. A second-generation of H_1 has emerged in recent years. These agents have a greater selectivity for peripheral H_1 receptors. Second-generation H_1 receptor antagonists may include, for example: azelastine (ASTELLN®), cetirizine (ZYRTEC®), desloratadine (CLARINEX®), fexofenadine (ALLEGRA®) and loratadine (CLARITINn®).

Vitamin E, also named alpha-tocopherol, is a well-known scavenger of free-radicals in the body. Free-radical scavengers are sometimes referred to as anti-oxidants. This scavenging process is important for detoxifying the body of chemicals which are known to promote apoptosis, or programmed cell death. Apoptosis is a scientific description of cellular destruction. Although it is a popular anti-oxidant, Vitamin E is poorly soluble in water and thus can be administered only as a liquid-oil formulation or in an oil formulation enclosed in a soft elastic capsule.

In one presently preferred embodiment of the present invention, therapeutically effective amounts of Diphenhydramine and Vitamin E (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein at least two of the active ingredients have physical states (e.g., solid, liquid, gas or dispersion) that differ. Consistent with the foregoing, multi-compartment, multi-phase capsules and encapsulation technology are herein contemplated to produce a delivery vehicle for delivering anti-allergic and anti-oxidant compounds to the body in a single dosage. A capsular format of the present invention may include the following composition:

Primary Capsule:	
Diphenhydramine HCl [25-100 mg/day]	50 mg
Secondary Capsule:	
Vitamin E [200-400 IU/day]	200 IU

The incorporation of time-release coatings to varying the release rates of the active ingredients (e.g., Diphenhydramine and Vitamin E) in the primary and secondary capsules, respectively, of the multi-compartment capsule may be used to target key time intervals or events when the body my be most able to utilize the named active ingredients. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment.

A therapeutically effective amount of Diphenhydramine may be introduced into at least a portion of the internal periphery of the receiving chambers of a primary capsule in the form of a solid and a therapeutically effective amount of Vitamin E may be introduced into at least a portion of a secondary capsule in the form of a liquid, if desired. Since the encapsulation process and multi-compartment, multi-phase capsule of the present invention are configured to apply to an anticipated treatment regime or medicinal design of a single dosage capsule, it will be readily appreciated that the introduction of one or more active ingredients into the receiving chambers of the primary and secondary capsules, respectively, is anticipated such that the various ingredients may be introduced in different receiving chambers to accommodate different treatment modalities. For example, a multi-compartment capsule may be formulated having Diphenhydramine introduced into the receiving chambers of the secondary capsule and Vitamin E may be introduced into the receiving chamber of the primary capsule. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Example IX

Celecoxib (Solid) & Ibuprofen (Liquid)

As appreciated by those skilled in the art, arthritis is an inflammatory condition typically affecting the synovia and cartilage of joints. It has been estimated that as many as one in three persons may experience symptoms associated with arthritis during their lifetime.

Anti-inflammatory agents may have many diverse therapeutic roles in the human body. Inflammation is the process undertaken by the body as it responds to an injury. A typical inflammatory response involves blood vessel dilation, increased blood flow to the site of injury, and influx of white blood cells to process and remove dead tissue. Inflammation can lead to pain and swelling at the site of injury. Medicaments used in modulating the inflammatory response may be divided into steroid and non-steroidal labels. The latter is more commonly identified as non-steroidal anti-inflammatory drugs (NSAIDs).

Celecoxib belongs to a class of NSAID compounds given the functional name cyclo-oxygenase-2 ("COX-2") inhibitors. This class may include, for example: rofecoxib (VIOXX®), celecoxib (CELEBREX®), valdecoxib (BEXTRA®), etodolac (LODINE®) and meloxicam (MOBIC®). As appreciated, the foregoing list is provided herein as exemplary and should not be considered exclusive or exhaustive.

Celecoxib is believed to inhibit the action of COX-2, an enzyme involved in the production of prostaglandins in the human body. Prostaglandins serve many diverse roles, one of which is to stimulate an inflammation mechanism in immune responses. Recently, Celecoxib was labeled by the United States Food and Drug Administration (FDA) for use in the treatment of osteoarthritis, rheumatoid arthritis, acute pain, and primary dysmenorrhea.

Ibuprofen is another NSAID and is believed to function as a non-selective inhibitor of cyclo-oxygenase. Ibuprofen has been labeled by the FDA for use in the treatment of osteoarthritis, rheumatoid arthritis, relief of mild to moderate pain and primary dysmenorrhea. Ibuprofen belongs to a class of compounds called phenyl-a-methylacetic acids, which are derived from salicylic acid. Non-selective cyclo-oxygenase inhibitors may include, for example: ibuprofen (MOTRIN®),

naproxen (NAPROSYN®), diclofenac (VOLTAREN®), flurbiprofen (ANSAID®), indomethacin (INDOCIN®), ketoprofen (ORUDIS®), ketorolac (TORADOL®), nabumetone (RELAFEN®), oxaprozm (DAYPRO®), piroxicam (FELDENE®) and sulindac (CLINORIL®). As appreciated, the foregoing list is provided herein as exemplary and should not be considered exclusive or exhaustive.

In one presently preferred embodiment of the present invention, therapeutically effective amounts of Celecoxib and Ibuprofen (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein Celecoxib comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of Ibuprofen. As shown in FIGS. **3** and **4**, a therapeutically effective amount of Celecoxib may be introduced into receiving chamber **218***a* and a therapeutically effective amount of Ibuprofen may be introduced into receiving chamber **218***b* of a multi-compartment capsule **210** of the present invention. Consistent with the foregoing, multi-compartment, multi-phase capsules and encapsulation technology are herein contemplated to produce a delivery vehicle for delivering anti-arthritic and anti-oxidant compounds to the body in a single dosage. A capsular format of the present invention may include the following composition:

Receiving Chamber (218a):	
Celecoxib [200-400 mg/day]	200 mg
Receiving Chamber (218b):	
Ibuprofen [2400-3200 mg/day]	800 mg

The incorporation of time-release coatings to varying the release rates of the active ingredients (e.g., Celecoxib and Ibuprofen) of the multi-compartment capsule **210** may be used to target key time intervals or events when the body may be most able to utilize the named active ingredients. Thus, the incorporation of time-release coatings in the encapsulation process when forming a multi-compartment capsule may be specifically designed to fit the needs and desires of numerous different users having similar conditions that are being targeted for treatment.

According to one presently preferred embodiment of the present invention, a therapeutically effective amount of Celecoxib may be introduced into at least a portion of the receiving chamber **218***a* in the form of a solid and a therapeutically effective amount of Ibuprofen may be introduced into at least a portion of the receiving chamber **218***b* of the primary capsule **211** in the form of a liquid.

In an alternative presently preferred embodiment of the present invention, therapeutically effective amounts of Celecoxib and Ibuprofen (active ingredients) may be introduced into receiving chambers of a multi-compartment capsule wherein Celecoxib comprises a physical state (e.g., solid, liquid, gas or dispersion) different from the physical state of Ibuprofen. As shown in FIG. **2**, a therapeutically effective amount of Celecoxib, in the form of a solid, may be introduced into receiving chamber **128** and a therapeutically effective amount of Ibuprofen, in the form of a liquid, may be introduced into receiving chambers **118** and **138** of a multi-compartment capsule **110** of the present invention.

The material forming the primary capsule shell **111** may be formulated in a manner allowing for immediate dissolution and release of the of the contents of receiving chamber **118**. The material forming the secondary capsule shell **120** may be formulated in a manner allowing for either an immediate dissolution or a time-delayed dissolution and release of the contents of receiving chamber **128**. The material forming the tertiary capsule shell **138** may be formulated in a manner allowing for time-delayed dissolution and release of the contents of receiving chamber **138**. In this presently preferred embodiment of the present invention, a total daily dosage of Ibuprofen may be delivered as two separate dosages within a single oral dosage form. One presently preferred embodiment of the present invention thus makes for a more convenient dosage form.

Since the encapsulation process and multi-compartment, multi-phase capsule of the present invention are configured to apply to an anticipated treatment regime or medicinal design of a single dosage capsule, it will be readily appreciated that the introduction of one or more active ingredients into receiving chambers defined within a capsule is anticipated such that the various ingredients may be introduced in different receiving chambers to accommodate different treatment modalities. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or method for implementing those principles.

Examples X

Some embodiments of the present invention will use of or more of the below ingredients in a multi-compartment capsule, combinable as would be recognized in view of the teachings of the present application in combination with the knowledge available to one of ordinary skill in the art. It is noted that the following non-limiting lists illustrate exemplary ingredients that can be used with the present invention, including the broader subclasses and classes to which they belong.

Botanicals
Green Trea
Griffonia Simplicifolia
Guarana
Guggul
Gymnema Sylvestre
Hawthorne
Henna
Herbal Extracts, Standardized
Herbal Teas
Hops
Horehound
Horse Chestnut
Horsetail
Hysop
Ipriflavone
Jojoba Oil
Juniper Berries
Kava Kava
Kelp Extract
Kola Nut
Kombucha
Kudzu
Larch
Lavender
Lemon Balm
Licorice Extract
Liden Flowers
Lobelia
Maca
Maitake Mushroom
Marshmallow
Milk Thistle
Molasses
Mushrooms
Neem

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Botanicals
Nettle
Noni
Nopal
Oatstraw
Octacosanol
Olive Extract
Orange Peel Extract
Oregano Oil
Oregon Mountain Grape
Organic Sweeteners
Parsley
Passion Flower
Pau d'Arco
Pennyroyal
Peppermint
Pfaffia Paniculata
Pine Bark Extract
Piper Longum
Pygeum Africanum
Quercitin
Raspberry Powder
Red Clover
Reishi Mushroom
Resveratrol Extract
Rhubarb Root
Rice Products
Rose Hips
Rosemary Extract
Sage
Sarsaparilla
Saw Palmetto
Schizandra
Seaweed extracts
Senna
Shatavari
Shiitake Mushroom
Silymarin
Skullcap
Slippery Elm
Soy Isoflavones
Soybean Products
Spirulina
St. John's Wort
Stevia
Summa
Tea Tree Oil
Terminalia Ajruna
Tribulus Terrestris
Triphala
Tumeric
Uva Ursi
Valerian Extract
Vegetable Extracts
Vitex
Wheat Germ
White Willow Bark
Wild Cherry bark
Wild Yam
Witch Hazel
Wormwood
Yarrow
Yellow Dock
Yerba Sante
Yohimbine
Yucca

Extracts
20-ECD 7-9%
4-Androstenedione 99%
Acetyl L-Carnitine HCI 99%
Adenophora Tetraohylla Ext 5:1
Alisma Extract 10:1
Alpha Lipoic Acid 99%

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Extracts
Angelica Root Extract
Arbutin 99%
Artemisia Extract 4:1
Artichoke Extract 5%, Globe
Asparagus Extract 4:1
Asparagus Powder
Astragulus Extract 10:1
Astragulus Extract 4:1
Astragulus Extract 5:1
Astragulus Root Extract 0.5%
Astragulus Root Powder
Atractylodes Extract 10:1
Avena Sativa Extract 10.1
Avena Sativa Extract 4:1
Barbed Skullcap Extract 10:1
Barberry Extract 10%
Bee Pollen Powder
Beta-Sisterol 35%
Bilberry Extract 10:1
Bitter Melon Extract 8:1
Black Cohosh Extract 2.5%
Black Cohosh Root Powder
Black Pepper Extract 4:1
Black Soy Bean Extract 10.1
Bone Powder
Boswellia Serrata Extract 65%
Broccoli Sprout Extract 10:1
Buchu Leaf Powder
Buplerum (Chai Hu) Extract 5:1
Burdock Root Extract 4:1
Cabbage Extract 4:1
Caffeine (Natural) 86-87%
Caffeine 99%
Calcium Citrate Granular 21%
Calcium-Pyruvate 99%
Carrot Root Extract 4:1
Cassia Nomame Extract 4:1
Catnip Extract 4:1
Cat's Claw (Inner Bark) Powder
Cauliflower Extract 4:1
Celandine (Greater) Extract 4:1
Celery Seed Extract
Cetyl Myristoleate 11%
Cetyl Myristoleate 20%
Chaenomeles Extract 4:1
Chamomile Flower Extract 10:1
Chamomile Flower Extract 4:1
Chaste Tree Berry Extract 4:1
Chitin
Chitosan 80%
Chitosan 90%
Chondroitin Sulfate 90%
Chrysin 99%
Cinnamon Powder
Cistanches Extract 5:1
Citrus Aurantium Extract 6%
Citrus Bioflavonoid Complex 13%
Citrus Peel Extract 5:1
Clove Extract 5:1
Clove Powder
Coca Extract 4:1
Codonopsis Pilosula Extract 5:1
Colostrum
Common Peony Extract 8:1
Cordyceps Extract 7%
Cornsilk Extract 4:1
Cornsilk Powder
Corydalis Extract 10:1
Cranberry Extract 4:1
Cranberry Powder
Curcumin Extract 95%
Cuscuta Extract 5:1
Damiana Extract 4:1
Damiana Leaves Powder
Dandelion Powder
Dandelion Root Extract 6:1
Danshen Extract 80%

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Extracts
D-Calcium Pantothenate
Devil's Claw Extract 2.5%
Devil's Claw Extract 4:1
Devil's Claw Root Powder
DHEA 99%
Diosgenin 95%
DL-Phenyl Alanine
DMAE Bitartrate
Doug Quai Extract 10:1
Doug Quai Extract 4:1
Doug Quai Root Powder
D-Ribose
Echinacea Angustifolia Extract 4:1
Echinacea Leaf Powder
Echinacea Purpurea Extract 10:1
Echinacea Purpurea Extract 4%
Echinacea Purpurea Extract 4:1
Echinacea Purpurea Root Powder
Elder Flower Extract 4:1
Elderberry Extract 20:1
Elderberry Extract 4:1
Epimedium Extract 10%
Epimedium Extract 10:1
Epimedium Extract 4:1
Epimedium Extract 5%
Epimedium Powder
Eucommia (Du Thong) Extract 5:1
Fennel Seed Extract 4:1
Fennel Seed Powder
Fenugreek Extract 4:1
Fenugreek Extract 6:1
Feverfew Extract 5:1
Fisetin
Fish Oil Powder
Forbidden Palace Flower Extract 5:1
Forskolin 8%
Fo-Ti Extract 12:1
Fo-Ti Extract 8:1
Fo-Ti Powder
Gardenia Extract 8:1
Garlic Extract. 4:1
Garlic Powder
Gentian Root Extract 6:1
Ginger Extract 4:1
Ginger Root Extract 5%
Ginger Root Powder
Ginkgo Biloba Extract 8:1
Ginkgo Extract 24/6%
Ginkgo Extract 24/6% <5
Ginkgo Extract 24/7%
Ginkgo Leaf Extract 4:1
Ginkgo Leaf Powder
Ginseng (Korean) Powder
Ginseng (Panax) Extract 5%
Ginseng (Panax) Extract 8%
Ginseng (Panax) Extract 80%
Glucomannans Konjac Powder
Glucosamine HCl 95% Granulation
Glucosamine HCl 99%
Gluesosamine Sulfate Potassium
Glucsosamine Sulfate Sodium 95% Granulation
Glucsosamine Sulfate Sodium 99%
Goldenrod Extract 4:1
Goldenrod Powder
Goldenseal Root Extract 14%
Goldenseal Root Powder
Gotu Kola Extract 16%
Gotu Kola Extract 4:1
Gotu Kola Extract 8:1
Gotu Kola Powder
Grape Fruit Powder
Grape Seed
Grape Seed Extract 10:1
Grape Seed Extract 20:1
Grape Seed Extract 4:1
Grape Seed Extract 5:1

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Extracts
Grape Seed Extract 95%
Grape Seed Powder
Grape Skin Extract 20:1
Grape Skin Extract 4:1
Grass-Leaved Sweetflai Extract
Green Lip Mussel Extract
Green Tea Extract 30%
Green Tea Extract 4:1
Green Tea Extract 95%
Guarana Seed Extract 10%
Guarana Seed Extract 22%
Guarana Seed Extract 25%
Guggul Extract 10%
Guggul Extract 2.5%
Gugulipid Extract 10%
Gymnema Sylvestre Extract 25%
Gymnema Sylvestre Powder
Hawthorne Berry Extract 4:1
Hawthorne Berry Powder
Hawthorne Leaf Extract 2%
Hearbacious Peony Extract 5:1
Hesperidin Extract 98%
Honeysuckle Herb Extract 4:1
Hops Flower Extract 4:1
Horehound Extract 10:1
Horehound Extract 4:1
Horehound Herb Powder-
Horse Chestnut Extract 20%
Horse Chestnut Extract 4:1
Horse Chestnut Powder
Horsetail Extract 7%
Horsetail Powder.
Houttuynia Cordata Extract 5:1
Hydrangea Extract 8:1
Hydroxy Apatite
Hyssop Extract 4:1
Indole-3-Carbino199%
Isodon Glaucocalyx Extract 10:1
Japanese Knotweed Extract
Jiaogulan Extract 4:1
Jin Qian Cao Extract 4:1
Jingjie Extract 4:1
Jujube Fruits Extract 4:1
Kava Kava Extract 30%
Kava Kava Powder
Kelp Extract 4:1
Kelp Powder
Kidney Bean Extract 10:1
Kidney Bean Pole 4:1
Kidney Bean Pole 8:1
Kidney Bean Powder
Kola Nut Extract 10%
Kudzu Extract 4:1
Kudzu Extract 6:1
Lettuce Extract 4:1
L-Glutamine
L-Glycine
Licorice Extract 10%
Licorice Extract 5:1
Licorice Powder
Lotus Leaf Powder
L-Tyrosine
Lycium Fruit Extract 4:1
Lycium Fruit Extract 5:1
Ma Huang Extract 6%
Ma Huang Extract 8%
Maca Extract 0.6%
Maca Extract 4:1
Maca Root Powder
Magnesium Stearate
Magnolia Bark Powder
Magnolia Officinal Extract 4:1
Maitike Mushroom Extract 4:1
Marigold Extract (Lutein 5%)
Methozyisoflavone 99%
Methylsufonylmethane 99%
Milk Thistle Extract 4:1

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Extracts
Milk Thistle Seed Extract 80%
silymarin
Morinda Extract 5:1
Motherwort Extract 4:1
Motherwort Powder
Mucuna Pruriens Extract (115% L-Dopa)
Muira Puama Extract 12:1
Muira Puama Extract 4:1
Muira Puama Powder
Mushroom Extract 10:1 (feishi)
Mustard Seed Extract 8:1
Myrobalan Extract 4:1
Myrrha Gum Extract 2.5%
N-Acetyl-D-Glucosamine
N-Acetyl-L-Cysteine
Nettle Extract 7%
Nettle Leaf Extract 4:1
Nettle Leaf Powder
Noni Powder
Olive Leaf Extract 18%
Olive Powder
Orange Peel Extract 4:1
Orange Peel Powder
Oroxylum Indicum Extract 4:1
Oroxylum Indicum Powder
Oyster Meat Powder
Oyster Shell Powder
Papaya Fruit Extract 4:1
Parsley Extract 10:1
Parsley Extract 4:1
Parsley Leaf Extract 4:1
Parsley Powder
Passion Flower Extract 4:1
Passion Flower Powder
Pau D'Arco Powder
Peppermint Extract 4:1
Peppermint Powder
Perilla Seed Extract 4:1
Periwinkle Extract 4:1
Pharbitidis Extract 4:1
Phosphatidyl Serine 20%
Pine Bark Extract 4:1
Plantago Asiatica Leaf Extract 5:1
Polygala Tenoifolia Extract 4:1
Polygonum Extract
Polygonum Extract 4:1
Pregnenolone 99%
Propolis Extract 3%
Pseudoginseng Extract
Psyllium extract 4:1
Pumpkin Seed Extract 4:1
Purple Willow Bark Extract 4:1
Purslane Herb Extract 4:1
Pygeum Extract 4:1
Quercetin
Radish Extract 4:1
Radix Isatidis Extract 4:1
Radix Polygoni Extract 4:1
Red Clover Extract 4:1
Red Pepper Extract 4:1
Red Yeast Rice
Red Yeast Rice Extract 10:1
Red Yeast Rice Powder
Rehmannia Root Extract 4:1
Reishi Mushroom Extract 4:1
Rhodiola Rosea Extract 4:1
Rhododendron Extract 4:1
Rhododendron Powder
Rhubarb Extract 4:1
Rhubarb Root Powder
Riboflavin (B2)
Rice Powder
Rosemary Extract 20%
Rumex Madaid Extract 4:1
Salvia Extract 10:1
Salvia Extract 4:1
SAMe

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Extracts
Saw Palmetto Extract 25%
Saw Palmetto Extract 25%
Saw Palmetto Extract 25%
Saw Palmetto Extract 4:1
Saw Palmetto Extract 45-50%
Saw Palmetto Oil 85-95%
Saw Palmetto Powder
Schizandra Extract 10:1
Schizandra Extract 4:1
Scopolia Acutangula Powder
Sea Cucumber Powder
Senna Leaf Powder
Sesame (Black) Seed Powder
Shark Cartilage Powder
Shitake Mushroom Extract
Siberian Ginseng Extract 0.8%
Siberian Ginseng Extract 4:1
Siberian Ginseng Powder
Skullcap Extract 4:1
Skullcap Extract 4:1
Slippery Elm Powder
Sodium-Pyruvate 99%
Songaria Cynomorium Extract 4:1
Songaricum Powder
Spirulina Powder
St. John's Wort Extract 03%
St. John's Wort Extract 4:1
St. John's Wort Powder
Stanol 50%
Stephania Extract 4:1
Stevia Extract 4:1
Sulfate N+
Suma Root Extract 4:1
Suma Root Powder
Taurine Powder
Thorowax Extract 4:1
Tomato Extract
Tomato Extract (0.2% Lycopene)
(trans)-Resveratrol 20-25%
Tribulus Extract 10:1
Tribulus Extract 40%
Tribulus Powder
Trifal Extract 4:1
Turmeric Extract 4:1
Turmeric Root Powder
Uva Ursi Extract 4:1
Uva Ursi Powder
Valerian Root Extract 0.8%
Valerian Root Extract 4:1
Valerian Root Powder
Vinca Major Seed Extract 10:1
White Wax Extract 4:1
White Willow Bark 15% (total salicins)
White Willow Bark 20%
White Willow Bark 25%
White Willow Bark Extract 4:1
White Willow Bark Powder
Wild Yam Extract 10:1
Wild Yam Extract 16%
Wild Yam Extract 4:1
Wild Yam Extract 6%
Wild Yam Powder
Williams Elder Extract 4:1
Wolfberry Fruit Extract 10:1
Wolfiporia Extract 8:1
Yellow Dock Root Extract 4:1
Yerba Mate Extract (2% caffeine)
Yerba Mate Extract 4:1
Yohimbe Bark Extract 15:1
Yohimbe Bark Extract 2%
Yohimbe Bark Extract 3%
Yohimbe Bark Powder
Yucca Extract 4:1

Enzymes
Alpha Galactosidase
Amylase
Bromelain
Cellulose
Papain
Peptidase
Protease
Proteolytic Enzymes
Superoxide Dismutase
Trypsin

Phospholipids
Lecithin
Phosphatidyl Choline
Phosphatidy Serine

Specialty Nutraceuticals
5-Hydroxytryptophan
Acetyl L-Carnitine
Alpha Lipoic Acid
Alpha-Ketoglutarates
Bee Products
Betaine Hydrochloride
Bovine Cartilage
Caffeine
Cetyl Myristoleate
Charcoal
Chitosan
Choline
Chondroitin Sulfate
Coenzyme Q10
Collagen
Colostrum
Creatine
Cyanocobalamin (Vitamin B12)
DMAE
Fumaric Acid
Germanium Sesquioxide
Glandular Products
Glucosamine HCL
Glucosamine Sulfate
HMB (Hydroxyl Methyl Butyrate)
Immunoglobulin (Immune System Support)
Lactic Acid
L-Carnitine
Liver Products
Malic Acid
Maltose-anhydrous
Mannose (d-mannose)
MSM
Other Carnitine Products
Phytosterols
Picolinic Acid
Pyruvate
Red Yeast Extract
SAMe
Selenium Yeast
Shark Cartilage
Theobromine
Vanadyl Sulfate
Velvet Deer Antler
Yeast

Herbal Oils
Aloe Vera
Artichoke Oil

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Herbal Oils
Artichoke Oil
Black Currant Seed Oil 14% GLA
Black Currant Seed Oil 15% GLA
Borage Oil 20% GLA
Borage Oil 22% GLA
Boswellia Serrata Oil
CLA Conjugated Linolic Acid 75% min.
Evening Primrose Oil 10% GLA
Evening Primrose Oil 9% GLA
Flax Seed Oil 50% ALA
Garlic Oil
Grape Seed Oil
Guggul Lipid Oil
Olive Leak Extract
Oregano Oil
Perilla Oil 60% ALA
Pumpkin Seed Oil
Pygeum Oil
Rosehip Oil
Rosemary Oil
Saw Palmetto Oil
Sterols
Tocotrienol Palm Oil
Walnut Oil
Wheat Germ Oil
Sesame Seed Oil
Dill Seed Oil
Clove Bud Oil
Ginger Root Oil
Cinnamon Leaf Oil
Fennel Seed Oil
Curcuma Longa Oil
Cummin Seed Oil
Celery Seed Oil
Coriander Seed Oil
Red Rasberry Seed Oil
Cranberry Seed Oil
Blackberry Seed Oil

Marine Oils
Cod Liver Oil (1000 A/100 D) Cod Liver Oil (2500A/250D)
Fish Oil 30% EPA/20% DHAFish oil Concentrated
Fish Oil DeodorizedMarine Lipid Oil 18/12
Marine Lipid Oil 30/20Marine Lipid Oil 36/24
Salmon Oil 18% EPA/12% DHA
Squalene Oil (Shark)

Other Oils
Alpha Lipoic Acid
Cetyl Myristoleate CM
Coenzyme Q10
Lecithin
Medium Chain Triglycerides MCT.

Vitamins
Ascorbic Acid (Vitamin C)
B Vitamins
Biotin
Fat Soluble Vitamins
Folic Acid
HCA (Hydroxycitric Acid)
Inositol
Mineral Ascorbates
Mixed Tocopherols
Niacin (Vitamin B3)

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Vitamins
Orotic Acid
PABA (Para-Aminobenzoic Acid)
Pantothenates
Pantothenic Acid (Vitamin B5)
Pyridoxine Hydrochloride (Vitamin B6)
Riboflavin (Vitamin B2)
Synthetic Vitamins
Thiamine (Vitamin B1)
Tocotrienols
Vitamin A
Vitamin D
Vitamin E
Vitamin F
Vitamin K
Vitamin Oils
Vitamin Premixes
Vitamin-Mineral Premixes
Water Soluble Vitamins

Carotenoids
Apocarotenal
Astaxanthin
Beta-Carotene
Canthaxanthin
Carotenoids
Lutein/Lutein Esters
Lycopene
Zeaxanthin

Hormones
7-Keto-DHEA
Androstenedione
DHEA
Melatonin
Nor-Androstenedione
Prognenolone
Progesterone
19 Nor-4-Androstendiol
19 Nor-4-Androstenedione
19 Nor-5-Androstenediol
19 Nor-5-Androstendione
3-Indolebutyric Acid
4 Androstendiol
4 Androstendione
6 Furfurylaminopurene
6-Benzylaminopurine

Minerals
Boron
Calcium
Chelated Minerals
Chloride
Chromium
Coated Minerals
Cobalt
Copper
Dolomite
Iodine
Iron
Magnesium
Manganese
Mineral Premixes
Mineral Products
Molybdenum
Other Minerals

-continued

Minerals
Phosphorus
Potassium
Selenium
Sodiuml
Specialty Minerals
Trace Minerals
Vanadium
Zinc
Malik Acid
Pyruvate

Probiotics
Acidophilus
Bifido Bacteria
Lactobacillus

Proteins/Amino Acids
Amino Acids
Betaine
Casein
Functional Soy
Glutamic Acid
L-Alanine
L-Arginine
L-Cysteine
L-Glutamine
L-Glycine
L-Histidine
L-Isoeueince
L-Leucine
L-Lysine
L-Methionine
L-Ornithine
L-Phenylalaline
L-Proline
L-Taurine
L-Threonine
L-Tryptophan
L-Tyrosine
L-Valine
N-Acetly-L-Cysteine
Protein
Soluble Soy
Soy Protein Isolates
Textured Soy
Whey Protein Isolates

Specialty Nutrients
ATP
Forskolin
Sterol Esters
Stanol Esters
Probiotics
Lactoferin
Lutein Esters
Zeaxanthin
Immunoglobulins
Ipriflavone
Isoflavones
Fructo-Oligo-Saccharides
Inulin
Huperzine A
Melatonin
Medicinal Mushrooms
Bile Products

Peptone Products
Glandular Products
Pancreatic Products
Thyroid Products
Ribose
Probiotics
Oleo Resins
Dill Seed Oleo Resin
Black Pepper Oleoresin
Capsicum Oleoresin

Examples XI

The present invention further contemplates the use of any active ingredients or medicaments known in the art. In this regard, it is well within the purview of the skilled artisan to select a particular combination of active ingredients or medicaments. The following non-limiting lists illustrate exemplary active ingredients or medicaments and the broader subclasses and classes to which they belong for use in this invention.

Medicaments Acting on the Autononic Nervous System
Adrenergic Medicaments
Cholinergic Medicaments
Direct Muscarinic Agonists Choline Esters
  acetylcholine
  bethanechol (URECHOLINE®)
  carbachol
  methacholine (PROVOCHOLINE®)
Alkaloids
  muscarine
  pilocarpine (PILOCAR®)
Direct Nicotinic Agonist
  nicotine
Acetylcholinesterase Inhibitors Acetylcholinesterase Inhibitors ("Reversible")
  edrophonium (TENSILON®)
  neostigmine (PROSTIGMIN®)
  physostigmine (ANTILIRIUM®)
Acetylcholinesterase Inhibitors ("Irreversible")
  (diisopropylflurophosphate DFP)
  echothiophate (PHOSPHOLINE®)
  isofluorophate (FLOROPRYL®)
Muscarinic Antagonists Atropine
  ipratropium (ATROVENT®)
  pirenzepine
  scopolamine
2-PAM: Acetylcholinesterase Reactivator Pralidoxime (Protopam) {2-PAM}: peripheral acetycholinesterase reactivator for certain phosphoryl-enzyme complexes
Ganglionic Blockers
  hexamethonium
  mecamylamine (INVERSINE®)
  trimethaphan
Catecholamines
  dobutamine (DOBUTREX®)
  dopamine (INTROPIN®)
  epinephrine
  isoproterenol (ISUPREL®)
  norepinephrine (LEVOPHED®)
Direct Adrenoceptor Agonist Medicaments
  albuterol (VENTOLIN®, PROVERITIL®)
  clonidine (CATAPRES®)
  methoxamine (VASOXYL®)
  oxymetazohne (AFRIN®)
  phenylephrine (NEO-SYNEPHRINE®)
  ritodrine (YUTOPAR®)
  salmeterol (SEREVENT®)
  terbutaline (BRETHINE®)
Indirect-Acting Sympathomimetic Medicaments
  amphetamine
  cocaine
  ephedrine, Pseudoephedrine tyramine
Alpha-Adrenoceptor Antagonists Medicaments
  doxazosin (Cardura CARDURA®)
  labetalol (TRANDATE®, NORMODYNE®)
  phenoxybenzamine (DIBENZYLINE®)
  phentolamine (REGITINE®)
  prazosin (MINIPRESS®)
  terazosin (HYTRIN®)
  tolazoline (PRISCOLINE®)
  trimazosin
  yohimbine (YOCON®)
β-Adrenoceptor antagonist Medicaments
  atenolol (TENORMIN®)
  butoxamine
  esmolol (BREVIBLOC®)
  labetalol (TRANDATE®, NORMODYNE®)
  metoprolol (LOPRESSOR®)
  nadolol (CORGARD®)
  pindolol (VISKEN®)
  propranolol (INDERAL®)
  timolol (BLOCADREN®)
Adrenergic Neuron Blocking Medicaments
gutanethidine (ISMELIN®)
reserpinme
Cardiovascular System Disorders
Cardiovascular testing and diagnosis
Hypertension (HTN)
Heart Failure
Ischemic Heart Disease
Myocardial Infarction
Arrhythmias
Isolated Diastolic Heart Failure and Cardiomyopathies
Cardiac Transplantation
Venous Thromboembolism
Stroke
Hyperlipidemia
Peripheral vascular disease
Diuretics
  carbonic-anhydrase inhibitors
  loop diuretics
  osmotic diuretics
  potassium sparing diuretics
  thiazide diuretics
Antiarrhythmic Medicaments
  Sodium Channel blocking agents
  isopyramide (NORPACE®)
  flecainide (TAMBOCOR®)
  ibutilide
  lidocaine (XYLOCAINE®)
  mexiletine (MEXITIL®)
  moricizine (ETHMOZINE®)
  procainamide (PRONESTYL®, PROCAN®)
  propafenone (RYTHMOL®)
  quinidine
  tocainide (TONOCARD®)
Calcium Channel blocking agents
  bepridil (VASOCOR®)
  diltiazem (CARDIZEM®)
  verapamil (ISOPTIN®, CALAN®)
Adrenergic receptor antagonists
  propranlol (INDERAL®)

Other medicaments
adenosine (ADENOCARD®)
amiodarone (CORDARONE®)
bretylium (BRETYLOL®)
disopyramide (NORPACE®)
esmolol (BREVIBLOC®)
sotalol (BETAPACE®)
Hypolipidemic medicaments
HMG CoA Reductase Inhibitors
atorvastatin (LIPITOR®)
cerivistatin (BAYCOL®)
lovastatin (MEVACOR®)
pravastatin (PRAVOCHOL®)
simvastatin (ZOCOR®)
Bile-acid sequestrants
cholestyramine (QUESTRAN®)
colestipol (COLESTID®)
Fibric acids
clofilbrate
fenofibrate (TRICOR®)
gemfibrozil (LOPID®)
niacin, nicotinic acid
probucol (LORELCO®)
Antihypertensive mendicants
Adrenergic receptor antagonists
acebutalol (SECTRAL®)
atenolol (TENORMIN®)
betaxolol (BETOPTIC®)
bisoprolol (ZEBETA®)
carteolol (CARTROL®)
clonidine (CATAPRES®)
labetalcl (NORMODYNE®)
metoprolol (TOPROL®)
penbutalol (LEVATOL®)
pindolol (VISKEN®)
prazosin (MINIPRES®)
propranlol (INDERAL®)
terazosin (HYTRIN®)
timolol (TIMOPTIC®)
Calcium Channel Antagonists
amlodipine (NORVASC®)
diltiazem (CARDIZEM®)
felodipine (Plendil)
isradipine (DYNACIRC®)
nicardipine (CARDENE®)
nifedipine (PROCARDIA®)
nimodipine (NIMOTOP®)
nisoldipine (SULAR®)
verapamil (ISOPTIN®, CATAN®)
Angiotensin Converting Enzyme (ACE) Inhibitor
benazepril (LOTENSIN®)
bepridil (VASCOR®)
captopril (CAPOTEN®)
enalapril (VASOTEC®)
fosinopril (MONOPRIL®)
lisinopril (PRINIVIL®, ZESTRIL®)
moexipril (UNIVASC®)
quinapril (ACCUPRIL®)
ramipril (ALTACE®)
Angiotensin II Receptor Antagonists
losartan (COZAAR®)
valasartan (DIOVAN®)
Diuretics
amiloride (MIDAMOR®)
bumetanide (BUMEX®)
chlorothalidone (HYGROTON®)
ethacrynic acid (EDECRIN®)
furosemide (LASIX®)
hydrochlorothiazide (DIURIL®)
indapamide (LOZOL®)
metolazone (ZAROXOLYN®)
torsemide (DEMADEX®)
triamterene
Other Agents
hydralazine (APRESOLINE®)
minoxidil (ROGAINE®)
nitroprusside (NIPRIDE®)
prazosin (MINIPRES®)
reserpine
sotalol (BREVIBLOC®)
spironolactone (ALDACTONE®)
terazosin (HYTRIN®)
Antianginal Medicaments
Organic nitrates
Calcium Channel Antagonists
Adrenergic Receptor Antagonists
amyl nitrite
erythrityl tetranitrate
isosorbide dinitrate (ISORDIL®)
nitroglycerin
pentaerythritol tetranitrate
Congestive Heart Failure Medicaments
phosphodiesterase (PDE) inhibitors
aminone (INOCOR®)
milrinone (PRIMACOR®)
carvedilol (COREG®)
cardiac glycosides
digitoxin
digoxin
diuretics
ACE Inhibitors
Dobutamine
dopamine
Respiratory System Disorders
Asthma
Chronic Obstructive Lung Disease (COLD)/Chronic Obstructive Pulmonary Disease (COPD)
Acute Respiratory Distress Syndrome (ARDS)
Drug-Induced Pulmonary Disease
Cystic Fibrosis
Corticosteroids
beclomethasone
betamethasone
cortisone
dexamethasone
fluticasone (FLOVENT®/FLONASE®)
hydrocortisone
methylprednisolone
prednisolone
prednisone
triamcinolone
sympathomimetics
albuterol (PROVENTIL®/VENTOLIN®)
salmeterol (SEREVENT®)
muscarinic antagonists
ipratropium (COMBIVENT®)
leukotriene pathway inhibitors
montelukast (SINGULAIR®)
zafirtukast (ACCOLATE®)
mast cell stabilizers
cromolyn (INTAL®)
methylxanthines
theophyline
aminophylline

Dnase (Pulmozyme)
Gastrointestinal System Disorders
Gastro-esophageal Reflux Disease (GERD)
Peptic Ulcer Disease
Inflammatory Bowel Disease
Nausea and Vomiting
Diarrhea, Constipation, Irritable Bowel Disease (IBD)
Portal Hypertension and Cirrhosis
Drug-Induced Liver Disease
Pancreatitis
Viral Hepatitis
Liver Transplantation
Histamine-2 receptor antagonists
famotidine (PEPCID®)
nizatidine (AXID®)
pantoprazole (PROTONIX®)
rabeprazole (ACIPHEX®)
ranitidine (ZANTAC®)
Proton Pump Inhibitors (PPIs)
esomeprazole (NEXIUM®)
lansoprazole (PREVACID®)
omeprazole (PRILOSEC®)
Anti-nausea/anti-vertigo medicaments
anticholinergics
antihistamines (Histamine-1 receptor antagonists)
dopamine antagonists
prokinetic gastric stimulant
serotonin 5HT3 receptor antagonists
dolasetron (ANZMET®)
granisetron (KYTRIL®)
ondansetron (ZOFRAN®)
other medicaments
hydroxyzine (ATARAX®, VISTARIL®)
corticosteroids
benzodiazepines
cannabinoids
Prokinetic gastric stimulants (gastric motility stimulants)
cisapride (PROPULSID®)
metoclopramide (REGLAN®)
Laxatives
Saline laxatives
magnesium salts
sodium salts
irritant/stimulant medicaments
cascara
senna
phenolphthalein
bisacodyl
casanthranol
castor oil
bulk producing medicaments
methylcellulose
psyllium
polycarbophil
lubricant
mineral oil
surfactants
docusate
miscellaneous
glycerin
lactulose
Anti-diarrheal medicaments
diphenoxylate
atropine
diphenoxin
loperamide
bismuth
lactobacillus
Ulcerative Colitis Medicaments
mesalamine
olsalazine
Renal System Disorders
Acute Renal Failure
Progressive Renal Failure/Chronic Renal Failure
Neurologic System Disorders
Multiple Sclerosis and inflammatory polyneuropathies
Epilepsy
Parkinson's disease and Movement Disorders
Pain management
Headache
Amyotrophic Lateral Sclerosis
Anti-epileptic medicaments
carbamazepine (TEGRETOL®)
divalproex sodium (DEPAKOTE®)
felbamate (Felbatol FELBATOL®)
gabapentin (NEURONTIN®)
lamotrigine (LAMICTAL®)
oxcarbazepine (TRILEPTAL®)
phenyloin (DILANTIN®)
topiramate (TOPAMAX®)
zonisamide (ZONEGRAN®)
Antimigraine medicaments
Serotonin 5HT1d receptor agonists
almotriptan (AXERT®)
frovatriptan (FROVA®)
naratriptan (AMERGE®)
rizatriptan (RIZALT®)
sumatriptan (IMITREX®)
zolmitriptan (ZOMIG®)
ergot alkaloids
dihydroergotamine (DHE®)
isometheptine/dichlorophenazone (MIDRIN®)
caffeine
pizotifen (SANOMIGRAN®)
Sedative-hypnotic Medicaments
benzodiazepines
alprazolam (XANAX®)
clonazepam (KLORIOPIN®)
clorazepate (TRANXENE®)
diazepam (VALIUM®)
flumazenil (ROMAZICON®)-antagonist
lorazepam (ATIVAN®)
midazolam (VERSED®)
triazolam (HALCION®)
barbiturates/Anesthetics
pentobarbital (Nembutal)
Phenobarbital (Lumninal LUMINAL®)
thiopental (PENTOTHAL®)
non-depressant anxiolytic
buspirone (BUSPAR®)
Treatment of Alcoholism
disulfiram (ANTABUSE®)
Pain Management Medicaments
Opioids
Opioid Peptides
beta-endorphin
dynorphin
enkephalins
Agonists
codeine
etorphine
fentanyl (SUBLIMAZE®)
hydrocodeine
hydromorphone

meperidine (DEMEROL®)
methadone (DOLOPHINE®)
morphine
oxycodone
propoxyphene
Agonist-antagonists
buprenorphine
Partial Agonist
dezocine (DALGAN®)
nalbuphine (NUBAIN®)
pentazocine (TALWAIN®)
Antagonist
naloxone (NARCAN®)
Non-opiate
acetaminophen (TYLENOL®)
tramadol (ULTRAM®)
Anti-Parkinsonism Medicaments
levodopa
carbidopa
bromocriptine (PARLODEL®)
pergolide (PERMAX®)
amantadine (SYMMETREL®)
selegiline (DEPRENYL®)
anticholinergic agents
dopamine Agonists
pramipexole (MIRAPEX®)
ropinirole (REQUIP®)
COMT inhibitors
entacapone (COMTAN®)
tolcapone (TASMAR®)
Anti-Spasticity Medicaments
baclofen (LIORESAL®)
botulinum toxin type A (BOTOX®)
carisoprodol (SOMA®, RELA®)
chlorphenesin (Maolate MAOLATE®)
chlorzoxazone (PARAFLEX®)
cyclobenzaprine (FLEXERIL®)
dantrolene (DANTRIUM®)
diazepam (VALIUM®)
metaxalone (SKELAXIN®)
methocarbamol (ROBAXIN®)
orphenadrine (NOR-FLEX®)
tizanidine (ZANAFLEX®)
Psychiatric System Disorders
Childhood psychiatric disorders
Attention Deficit Hyperactivity Disorder (ADHD)/Attention Deficit Disorder (ADD)
Eating disorders
Alzheimer's disease and Dementia Disorders
Substance abuse and Addictive Disorders
alcohol, tobacco and caffeine abuse
Schizophrenia
Depressive disorders
Bipolar disorders
Anxiety disorders
Obsessive-Compulsive disorders
Sleep disorders
Psychostimulant Medicaments
amphetamine mixed salts (ADDERALL®)
dextroamphetamine (DEXEDRINE®)
methylphenidate (RITALIN®, CONCERTA®)
Antipsychotic Medicaments (dopamine antagonists)
Phenothiazine type
chlorpromazine (THORAZINE®)
fluphenazine (PROLIXIN®)
Thioxanthene type
thiothixene (NAVANE®)
Butyrophenone type
haloperidol (HALDOL®)
Dibenzodiazepine type
clozapine (CLOZARIL®)
Thienobenzodiazepine type
olanzapine (ZYPREXA®)
quetiapine (SEROQUEL®)
Antidepressant Medicaments
Tricyclic antidepressants (TCA's)
amitriptyline (EVAVIL®, ENDEP®)
clomipramine (ANAFRANIL®), also a SSRI
desipramine (Norpramin NORPRAMIN®)
doxepin (SINEQUAN®)
imnipramine (TOFRANIL®)
maprotiline (LUDIOMIL®)
nortriptyline (AVENTYL®, PAMELOR®)
protriptyline (VIVACTIL®)
Monoamine oxidase inhibitors (MAO-I's)
clorgyline (specific for MAO type A)
isocarboxazid (MARPLAN®)
phenelzine (NARDIL®)
tranylcypromine (PARNATE®)
Second Generation Medicaments (not including SSRIs)
amoxapine (ASENDIN®)
bupropion (WELLBUTRIN®)
netazodone (SERZONE®)
trazodone (DESYREL®)
Serotonin-Specific Reuptake Inhibitors (SSRIs)
citalopram (CELEXA®)
clomipramine (ANAFRANIL®)
escitalopram (LEXAPRO®)
fluoxetine (PROZAC®)
fluvoxamine (LUVOX®)
paroxetine (PAXIL®)
sertraline (ZOLOFT®)
Other
lithium
mirtazapine (TEMERON®)
venlafaxine (EFFEXOR®)
Anti-Anxiety Agents
barbiturates
benzodiazepines
buspirone (BUSPAR®) chloral hydrate
doxepin
hydroxyzine
sedative-hypnotics
serotonin reuptake inhibitors
Anti-Demential Medicaments
cholinesterase inhibitors
donepezil (ARICEPT®)
galantamine (REMINYL®)
rivastigmine (EXELON®)
tacrine (COGNEX®)
Endocrinologic System Disorders
Diabetes mellitus
Thyroid disorders
Adrenal Gland disorders
Pituitary Gland disorders
ACTH
Adrenal androgens
Adrenocortical Function Antagonists
Mineralocorticoid antagonists
Anti-Diabetic Medicaments
Insulin
Sulfonylureas
acetohexamide (DYMELOR®)
chlorpropamide (DIABINESE®)

glimepiride (AMARYL®)
glipizide (GLUCOTROL®)
glyburide (MICRONASE®, DIABETA®)
tolazaride (TOLINASE®)
tolbutamide (ORINASE®)
Biguanides
metformin (GLUCOPHAGE®)
Alpha-glucosidase Inhibitors
acarbose (PRECOSE®)
miglitol (GLYSET®)
Thiazolidinedione Derivatives
pioglitazone (ACTOS®)
rosiglitazone (AVANDIA®)
troglitazone (REZULIN®)
Thyroid Disorder Medicaments
Levothyroxine
Liothyronine
Liotrix
Hypothalamic and Pituitary Gland Medicaments
bromocriptine (PARLODEL®)
chorionic gonadotropin (hCG®)
corticotropin generic (ACTH®)
cosyntropin (CORTROSYN®)
desmopressin (DDAVP®)
gonadorelin acetate (GnRH) (LUTREPULSE®)
gonadorelin hydrochloride (GnRH) (FACTREL®)
goserelin acetate (ZOLADEX®)
growth hormone
histrelin (SUPPRELIN®)
leuprolide (LUPRON®)
menotropins (hMG) (PERGONAL®, HUMEGON®)
natarelin (SYNAREL®)
octreotide (SANDOSTATIN®)
oxytocin (PITOCINIT®, SYNTOCINON®)
pergolide (PERMAX®)
protirelin (THYPINONE®, RELEFACT TRH®)
sermorelin (GHRH) (GEREF®)
somatrem (PROTROPIN®)
somatropin (HUMATROPE®, NUTROPIN®)
thyrotropin (TSH) (THYTROPAR®)
urofollitropin (METRODIN®)
vasopressin (Pitressin Synthetic)
Gynecologic System and Obstetric Conditions
Pregnancy and Lactation
Infertility
Contraception
Menstruation-related disorders
Endometriosis
Hormone Replacement Therapy (HRT)
Conjugated estrogens (PREMARIN®)
desogestrel
di-norgestrel
ethinyl diacetate
ethinyl estradiol
levonorgestrel
medroxyprogesterone
norethindrone norgestimate
progesterone
Urologic System Disorders
Erectile Dysfunction
Benign Prostatic Hypertrophy
Urinary Incontinence
apomorphine
alprostadit
phosphodiesterase (PDE-5) inhibitors
sildenafil (VIAGRA®)
tadalafil (CIALIS®)
vardenafil (LEVITRA®)
tolterodine (DETROL®)
tamulosin (FLOMAX®)
yohimbine
Immunologic System Disorders
Systemic Lupus Erythematosus and other Collagen-vascular diseases
Allergic and pseudo-allergic drug reactions
Bone and Joint System Disorders
Osteoporosis and Osteomalacia
Rheumatoid Arthritis
Osteoarthritis
Gout and hyperuricemia
Medicaments used in the Control of Inflammation
Non-steroidal anti-inflammatory drugs (NSAIDs)
aspirin
diclofcenac (CATAFLAM®, VOLTAREN®)
diflusnisal (DOLOBID®)
etodolac (LODINE®)
fenoprofen (NALFON®)
flubiprofen (ANSAID®)
ibuprofen (MOTRIN®, ADVIL®, NUPRIN®)
indomethacin (INDOCIN®)
ketoprofen (ORUDIS®)
ketcrolac (TORADOL®)
mecofenamate
nabumetone (RELAFEN®)
naproxen (NAPROSYN®)
oxaprozin (DAYPRO®)
phenylbutazone
piroxicam (FELDENE®)
salicytate
sulindac (CLINORIL®)
tolmetin (TOLECTIN®)
Cyclocygenase-2 inhibitors (COX-2)
celecoxib (CELEBREX®)
rofecoxib (VIOXX®)
Arthritis and Gout Medicaments
allopurinol
anti-malarial compounds
chloroquine
colchicine
enbrel
Glucocorticoids
Gold
methotrexate
NSAIDs
Penicillamine
Other Medicaments
alendronate (FOSAMAX®)
raloxifene (EVISTA®)
Disorders of the Eyes, Ears, Nose, and Throat Systems
Glaucoma
Allergic rhinitis
Histamine-1 receptor antagonists
brompheniramine (DIMETANE®)
cetirizine (ZYRTEC®)
chlorpheniramine (CHLOR-TRIMETON®)
clemastine (TAVIST®)
cyproheptadine (PERIACTIN®)
dimenhydrinate (DRAMAMINE®)
diphenhydramine (BENDARYL®)
doxylamine (SOMINEX®, UNISOM®)
fexofenadine (ALLEGRA®)
loratidine (CLARITIN®)
Sympathomimetic medicaments
pseudoephedrine (Sudated)

- Dermatologic System Disorders
  - Acne
  - Psoriasis
  - Rosacea and pigmentation disorders
- Hematologic System Disorders
  - Hematopoeisis
  - Anemias
  - Coagulation disorders
  - Sickle-cell anemia
  - Drug-induced hematologic disorders
  - Coagulation Disorders Medicaments
  - aspirin
  - clopidogrel (PLAVIX®)
  - fibrinolytic inhibitors
  - fibrinolytics
  - glycoprotein (GP) IIb/IIIa antagonists/monoclonal antibodies
    - abciximab (REOPRO®)
    - eptifibatide (INTEGRELIN®)
    - tiofibran (AGGRASTAT®)
  - heparin
  - low-molecular weight heparins
  - Plasma fractions-blood factors
  - ticlopidine (TICLID®)
  - vitamin K
  - warfarin (COUMADIN®)
- Infectious System Diseases
  - Central Nervous System (CNS) infections
  - Lower Respiratory Tract Infections
  - Upper Respiratory Tract Infections
  - Skin and Soft Tissue Infections
  - Infective Endocarditis
  - Tuberculosis
  - Gastrointestinal Infections and Enterotoxigenic poisonings
  - Intra-abdominal Infections
  - Parasitic diseases
  - Urinary Tract Infections and Prostatis
  - Sexually Transmitted Diseases
  - Bone and Joint Infections
  - Sepsis and Septic Shock
  - Superficial Fungal Infections
  - Invasive Fungal Infections
  - Infections in Immunocompromised Patients
  - Antimicrobial prophylaxis in Surgery
  - Vaccines, toxoids, and other immunobiologics
  - Human Immunodeficiency Virus Infection
- Medicaments Used in Infectious Diseases
  - Cell Wall Synthesis Inhibitors
    - Penicillins
    - amoxicillin (AMOXIL POLYMOX®)
    - ampicillin (PRINCIPEN®, OMNIPEN®)
    - benzathine Penicillin G
    - benzyl Penicillin (PENICILLIN G®)
    - carbenicillin (GEOCILLIN®)
    - cloxacillin (CLOXAPEN®)
    - dicloxacillin (DYNAPEN®)
    - methicillin (STAPHCILLIN®)
    - mezlocillin
    - nafcillin (NAFCIL®, UNIPEN®)
    - oxacillin
    - phenoxymethyl Penicillin (PENICILLIN V®)
    - piperacillin (PIPRACH®)
    - ticarcillin (TICAR®)
  - Cephalosporins
    - 1st generation:
      - cefazolin (ANCEF®, DEFZOL®)
      - cephalexin (KEFLEX®)
      - cephatothin (KEFLIN®)
    - 2nd generation:
      - cefaclor (CECLOR®)
      - cefoxitin (MEFOXIN®)
      - cefpodoxime (VANTIN®)
      - cefuroxime (ZINACEF®, CEFTIN®)
      - loracarbef (LORABID®)
    - 3rd generation:
      - cefoperazone
      - cefotaxime (CLAFORAN®)
      - cefotetan
      - ceftazidime (FORTAX®, TAXIDIME®, TAZICEF®)
      - ceftriaxone (ROCEPHIN®)
      - veftizoxime (CEFIZOX®)
    - 4th generation:
      - cefepime
  - Other beta-Lactams aztreonam (AZACTAN®)
    - clavulanic acid
    - imipenem (PRIMAXIN®)
    - meropenem (MERREM IV®)
    - sulbactam
  - Other Cell-Wall Synthesis Inhibitors bacitracin
    - cycloserine
    - fosfomycin (MONUROL®)
    - vancomycin (VANCOCIN®)
  - Agents Which Affect Cell Membranes
    - Polymixins
      - Colistimethate
      - Potymyxin B
  - Protein Synthesis Inhibitors
    - Amino glycosides
      - amikacin (AMIKIN®)
      - gentamicin (GARAMYCIN®)
      - kanamycin (KANTREX®)
      - neomycin
      - netilmicin (NETROMYCIN®)
      - streptomycin
      - tobramycin
    - Tetracyclines
      - demeclocycline (DECLOMYCIN®)
      - doxycycline
      - doxycyclmine (VIBRAMYCIN®, DORYX®)
      - tetracycline (ACHROMYCIN®)
    - Macrolides
      - azithromycin (ZITHROMAX®)
      - clarithromycin (BIAXIN®)
      - erythromycin esters erythromycin
    - Other Protein Synthesis Inhibitors
      - Chloramphenicol (CHLOROMYCETIN®)
      - Clindamycin (CLEOCIN®)
      - Spectinomycin (TROBICIN®)
    - Inhibitors of Folate-Dependent Pathways
      - co-trimoxazole
      - silver Sulfadiazine
      - sodium Sulfacetamide
      - sulfamethoxazile (GANTANOL®)
      - sulfasalazine (AZULFIDINE®) (SALICYLAZOSULFAPYRIDINE®)
      - sulfisoxazole (GANTRISIN®)
      - sulfonamides
    - Dihydrofolate Reductase Inhibitor
      - trimethoprim

DNA Gyrase Inhibitors
- ciprofloxacin (CIPRO®)
- gatifloxacin (TEQUIN®)
- levofloxacin (LEVAQUIN®)
- lomefloxacin (MAXAQUIN®)
- nalidixic acid
- ofloxacin (FLOXIN®)

Urinary Tract Antiseptics
- nitrolurantoin

Antimyobacterial Agents
- First-line anti-TB medicaments
- ethambutol
- isoniazid (INI-I®)
- pyrazinamide
- rifampin (RIMACTANE®)
- streptomycin

Second-line anti-TB medicaments
- capreomycinA
- cycloserine
- dapsone
- ethionamide
- para-aminosalicylic acid

AntiFungal Agents
- amphotericin B (FUNGIZONE®, AMPHOTEC®)
- clotrimazole (MYCELEX®)
- fluconazole (DIFLUCAN®)
- flucytosine
- griseofulvin
- itraconazole (SPORANOX®)
- ketoconazole (NIZORAL®)
- miconazole (MONISTAT®)
- nystatin (MYCOSTATIN®)

Antiparasitic Agents

Antimalarials
- chloroquine (ARALEN®)
- mefloquine (LARIAM®)
- primaquine
- pyrimethamine-sulfadoxine (FANSIDAR®)

Anti protozoals
- metronidazole (FLAGYL®)
- pentamidine isethionate
- pyrimethamine-sulfonamide
- trimethoprim (generic) sulfamethoxazole (GANTANOL®)

Antihelminthic Medicaments
- mebendazole
- praziquantel (BILTRICIDE®)
- pyrantel pamoate
- thiabendazole (MINTEZOL®)

Antiviral Medicaments
- acyclovir (ZOVIRAX®)
- didanosine (DDI®)
- foscarnet (FOSCAVIR®)
- ganciclovir (DHPG®, CYTOVENE®)
- ribarvirin
- rimantadine
- stavudine (d4T))
- valacyclovir (VALTREX®)
- vidarabine (VIRA-A®)
- zalcitabine (DDC®)
- zidovudine (AZIDOTHYMIDINE®, AZT®)

Protease inhibitors
- indinavir (CRIXIVAN®)
- ritonavir (NORVIR®)
- saquinavir (FORTOVASE®)

Oncologic and Immunological Disorders
- Breast Cancer
- Lung Cancer
- Colorectal Cancer
- Prostate Cancer
- Malignant Lymphomas
- Ovarian Cancer
- Acute Leukemias
- Chronic Leukemias
- Melanoma and other Skin Cancers
- Hematopoeitic Stem Cell Transplantation

Anti-Neoplastic Medicaments

Alkylating Agents
- busulfan (MYLERAN®)
- carboplatin (PARAPLATIN®)
- carmustine (BNCU®, BiCNU®)
- cisplatin (PLATINOL®)
- cyclophosphamide (CYTOXAN®)
- ifofamide (IFEX®)
- lomustine (CCNU®, CeeNU®)
- mechlorethamine (MUSTARGEN®)
- meiphalan (ALKERAN®)
- procarbazine (MATULANE®)
- thiotepa

Antimetabolites
- folic acid Antagonist
- methotrexate

Purine Antagonists 6-mercaptopurine
- 6-thioguanine

Pyrimidine Antagonists
- cytarabine (ARA-C®)
- fluorouracil (5-FU®)

Hormonal Agents Hormones
- diethylstilbestrol (DES®)
- estrogens
- prednisone (DELTASONE®)

Modulation of Hormone Release & Action Aminoglutethimide
- leuprolide acetate
- tamoxifen (NOLVADEX®)

Plant Alkaloids
- Vinca Alkaloids
- vinblastine (VELBAN®)

vincristine (Oncovin ONCOVIN®)

Podophyllotoxins
- Etoposide (VP-16®)

Other
- docetaxel (TAXOTERE®)
- paclitaxel (TAXOL®)

Antibiotics
- bleomycin (BLENOXANE®)
- dactinomycin (COSMEGEN®)
- daunorubicin (DAUNOXOME®)
- doxorubicin (ADRIAMYCIN®)
- mitomycin (MUTAMYCIN®)

Other Anti-neoplastic Medicaments
- amsacrine (AMSA®)
- azathioprine (IMURAN®)
- capecitabine (XELODA®)
- chlorambucil (LEUKERAN®)
- cyclosporine (SANDIMMUNE®, NEORAL®)
- gemcitabine (GEMZAR®)
- hydroxyurea (HYDREA®)
- mitotane (SODREN®)
- mitoxantrone (NOVANTRONE®)
- pamidronate (AREDIA®)

- Immunosuppressant Medicaments
  - 15-desoxyspergualin
  - corticosteroids
  - cyclosporine
  - Interferons
  - Interleukins
  - mycophenolate mofetil
  - sirolimus (RAPAMYCIN®)
  - tacrolimus
  - thalidomide
- Nutritional Disorders
  - Malnutrition, vitamin and mineral deficiencies
  - Enteral Nutrition
  - Obesity
  - orlistat (XENICAL®)
  - appetite suppressants
  - sympathomimetic stimulants
  - amphetamine stimulants
  - Mineral supplementation
  - calcium ion iodine
  - iron
  - magnesium ion
  - phosphorous
  - potassium ion
  - selenium
  - sodium ion
  - zinc
  - Fat-soluble vitamins
  - vitamin A
  - vitamin D
  - vitamin E
  - vitamin K
  - Water-soluble vitamins
  - vitamin C
  - thiamine (vitamin B1)
  - riboflavin (vitamin B2)
  - niacin (vitamin B3)
  - pyridoxine (vitamin B6)
  - folate
  - cyanocobalamin (vitamin B12)
- Medicaments Used to Alleviate Symptoms of Allergic Rhinitis, Upper Respiratory Symptoms, Cough, Mild Aches and Pains
  - Nasal Decongestants
  - ephedrine
  - phenylephrine
  - phenylpropanolamine
  - pseudoephedrine
  - Antihistamines (Histamine-1 receptor antagonists)
  - Antitussive agents
  - benzonatate
  - codeine
  - dextromethorphan
  - Expectorants
  - guaifenesin
  - iodinated glycerol
  - terpin hydrate
  - Xanthines
  - aminophyline
  - caffeine
  - dyphylline
  - theophylline
  - Pain relievers
  - narcotic agonists
  - NSAIDS
  - acetaminophen
- Dietary Supplements
  - Arnica
  - Bilberry
  - Black Cohosh
  - Cat's claw
  - Chamomile
  - Echinacea
  - Evening Primrose Oil
  - Fenugreek
  - Flaxseed
  - Feverfew
  - Garlic
  - Ginger root
  - *Ginkgo biloba*
  - Ginseng
  - Goldenrod
  - Hawthorn
  - Kava-Kava
  - Licorice
  - Milk thistle
  - Psyllium
  - Rauwolfia
  - Senna
  - Soybean
  - St. John's wort
  - Saw palmetto
  - Turmeric
  - Valerian
- Therapeutic Proteins and Biotechnology Medicaments
- Additional Agents: NORVACS®, NEURONTIN®, PAXIL®, AUGMENTIN®, PROPECIA®, LAMISIL®, LESCOL®, bisphosphonate.
- Other Drugs
  - abacavir sulfate
  - acetazolamide
  - acetylsalicylic acid
  - albendazole
  - allopurinol
  - amiloride hydrochloride
  - amitriptyline hydrochloride artemether
  - atropine sulfate
  - benznidazole
  - biperiden hydrochloride
  - chloroquine phosphate
  - chlorpheniramine maleate
  - chlorpromazine hydrochloride
  - cimetidine
  - ciprofloxacin hydrochoride
  - clofazimine
  - clomiphene citrate
  - clomipramine hydrochloride
  - cloxacillin sodium
  - codeine phosphate
  - dapsone
  - didanosine
  - diethylcarbamazine citrate
  - digoxin
  - diloxanide furoate
  - DL-methionine
  - Doxycycline
  - Efavirenz
  - ergometrine maleate
  - ergotamine tartrate
  - erythromycin ethyl succinate
  - ethambutol hydrochloride
  - ethosuximide
  - ferrous sulfate
  - alendronate sodium

amlodipine besylate
amphetamine (mixed salts)
atorvastatin calcium
benazepril hydrochloride
bisoprolol fumarate
bupropion hydrochloride
carbidopa
cefprozil
cetirizine hydrochloride
citalopram hydrobromide
clindamycin hydrochloride
clonidine hydrochloride
clopidogrel bisulfate
cyclobenzaprine hydrochloride
desloratadine
digoxin
diltiazem hydrochloride
doxazosin mesylate
doxycycline
enalapril maleate
fexofenadine hydrochloride
fluoxetine hydrochloride
folic acid
fosinopril sodium
hydrocodone bitartrate
hydrocodone
hydroxyzine hydrochloride
indinavir
irbesartan
isosorbide mononitrate
lamivudine
levothyroxine sodium
lopinavir
loratadine
losartan potassium
meclizine hydrochloride
medroxyprogesterone acetate
meperidine
metformin hydrochloride
methylphenidate hydrochloride
methylprednisolone
metoclopramide hydrochloride)
minocycline hydrochloride
montelukast sodium
naproxen sodium
nelfinavir
nevirapine
niclosamide
nicotinamide
nifurtimox
nitrofurantoin
nortriptyline hydrochloride
oxybutynin chloride
oxycodone hydrochloride
paracetamol
paroxetine hydrochloride
penicillin V potassium
phenyloin sodium
pioglitazone hydrochloride
prednisolone
primaquine phosphate
pravastatin sodium
prednisolone
promethazine hydrochloride
promethazine fumarate
propylthiouracil
pyrantel embonate
pyridostigmine bromide
raloxifene hydrochloride
ranitidine hydrochloride
rifampicin
risedronate sodium
risperidone
rosiglitazone maleate
salbutamol sulfate
saquinavir mesylate
sertraline hydrochloride
sildenafil citrate
sulfadiazine
sumatriptan succinate
tamoxifen citrate
tamsulosin hydrochloride
temazepam
terazosin hydrochloride
timolol maleate
tolterodine tartrate
tramadol hydrochloride
trazodone hydrochloride
triclabendazole
valacyclovir hydrochloride
valdecoxib
valproic acid
valsartan
venlafaxine hydrochloride
verapamil hydrochloride
warfarin sodium
zolpidem tartrate

Examples XII

As can be seen above, various embodiments of the present invention can be utilized in specific medical applications. By way of example only and not by way of limitation, the present invention can be practiced to prepare delivery devices for use in chemotherapy to address/treat, by way of example and not by limitation, the following aspects of chemotherapy: psychological, timing (to coincide with tumor growth for example) route of administration, nausea, vomiting (CINV), compliance, and cost (e.g. reduce hospital management of patients, reduce the number of "repeat" drug doses due to patient vomiting, etc.). Still further, the just mentioned aspects are not limited to chemotherapy, as the present invention can be practiced to address common aspects between chemotherapy and other treatments.

Further by way of examples, capsules containing Zofran (ondansertron), Temodar (temozolomide) can be made.

Still further, the present invention can be used in cardiovascular treatments, for example hypertension, heart failure, and heart rhythm disorders. Also, the present invention can be used in immunology (e.g. transplant rejections, auto-immune disorders, etc.). The present invention can be used to treat neurological disorders (such as Parkinson's disease, dementia, stroke, epilepsy, and migraine headache, etc.), psychiatric disorders (schizophrenia, bipolar disease, depression, anxiety, ADHD/ADD, Addictions, etc.), infectious diseases (fungal, bacterial, viral (HIV), etc.), and in anesthesiology (induction anesthesia, local anesthesia). Furthermore, the present invention has application in endocrinology (cholesterol, diabetes, hormone replacement therapy, thyroid dysfunction, oral contraception, obesity, etc.), dermatology (onychomycosis, acne, rosaceae, psoriasis, etc.), rheumatology (arthritis, gout, osteoporosis/Osteomalacia), respiratory fields (asthma, emphysema, cystic fibrosis, etc.), gastro-intestinal fields (gastroesophageal reflux disease, ulcer prophylaxis, crohn's disease, inflammatory bowel disease, etc.), chronic real failure (vitamin and mineral replacement, blood pressure regu-

lation, diabetes, depression, etc.), genito-urinary (enlarged prostate/BPH, overactive bladder, erectile dysfunction, feminine yeast infections, etc.) and hematology-oncology (thromboembolous, hermatopoeisis, neoplastic disease, nausea/vomiting).

Examples XIII

The present invention can be utilized with a variety of excipients. Categories of excipients include, but are not limited to, Binders, Disintegrants Fillers (diluents), Lubricants, Glidants (flow enhancers), Compression aids, Colors, Sweeteners, Preservatives, Suspensing/dispersing agents, Film formers/coatings, Flavors, and Printing inks. Still further by way of example and not by limitation, the present invention can be utilized with the following excipients:

Magnesium Stearate	Titanium Dioxide
Lactose	Stearic Acid
Microcrystalline Cellulose	Sodium Starch Glycolate
Starch (corn)	Gelatin
Silicon Dioxide	Talc
Sucrose	Croscarmellose
Calcium Stearate	Hydroxy Propyl Cellulose
Povidone	Ethylcellulose
Pretzelatinized Starch	Calcium Phosphate (dibasic)
Hydroxy Propyl Methylcellulose	Crospovidone
OPA products (coatings & inks)	Shellac (and Glaze)

Examples XIV

Examples of the supporting nutraceutical formulations are to illustrate examples where specific categories of the natural products industry can be utilized with the present invention. There are many more categories than the ones that are listed and therefore this is for simply for the purpose to show that the technology is broad and could be utilized for many specific categories. The specific mg of each product is not included due to the amounts of each material is typically based upon the formulators opinions, however there are some (RDA) recommended daily allowances that could be used to determine the formulation.

Category: Antioxidant
Primary Capsule:
d alpha Tocopherol
Beta Carotene
Tocotrineol
Grape Seed Oil
Secondary Capsule:
Selenium
Vitamin C Ester
Category: Brain Support
Primary Capsule:
d alpha Tocopherol
DHA
Omega 3
Lecithin
Choline
Secondary Capsule:
Coenzyme Q 10
Ginkgo Biloba
B12
Category: Mood Support
Primary Capsule:
D alpha Tocopherol
Lecithin
DHA
Omega 3
Secondary Capsule:
SAME
L Tyrosine
Category: Cardio Support
Primary Capsule:
d alpha Trocopherol
Tocotrienol
Flax Oil Omega 6
Fish Oil Omega 3
Secondary Capsule:
Calcium
Magnesium
Coenzyme Q 10
Category: Diet Support
Primary Capsule:
Conjugated Linolic Acid
Flax Seed Oil
Secondary Capsule:
Chromium
Zinc
L Carnitine
Category: Immune Support
Primary Capsule:
Garlic Oil
Olive Leaf Oil
d alpha Tocopherol
Secondary Capsule:
Zinc
Echinacea
Category: Laxative Support
Primary Capsule:
Aloe Vera
Flax Seed Oil
Secondary Capsule:
Senna Leaf
Psyllium
Category: Prostate Support
Primary Capsule:
Saw Palmetto Oil
Pygeum Oil
Flaxseed Oil
Pumpkin Seed Oil
Secondary Capsule:
Selenium
Zinc
Boswellia Serrata
Category: Inflammation Support
Primary Capsule:
Boswellia Serrata Oil
Guggul Oil
Omega 3 Oil
Ginger Oil
Secondary Capsule:
Curcumin
Holy Basil
Category: Sports Nutrition/Muscle Support
Primary Capsule:
Conjugated linolic Acid
MCT Oil
Secondary Capsule:
Zinc
Chromium
Tribulus Terestris
19 Nor-5-Androstendione

Category: Menopause Support
Primary Capsule:
Evening Primrose Oil
Red Raspberry Oil
Secondary Capsule:
Licorice Root
Black Cohosh
Soy Isoflavones
Category: Cholesterol Support
Primary Capsule:
Sterol Esters
Guggul Oil
d alpha Tocopherol
Tocotrienol
Secondary Capsule:
Garlic Extract
Zinc

From the above discussion, it will be appreciated that the present invention provides novel integrated capsule delivery apparatus and methods for delivering diverse physical states (e.g., solid, liquid, gas or dispersion) of a single active ingredient or medicament (e.g., pharmaceutical, biotechnical, nutraceutical, vitamin, dietary supplement, mineral or combination thereof), or a plurality of active ingredients or medicaments, in a single dosage capsular form, wherein at least two of the active ingredients or medicaments if different receiving chambers have physical states that differ. In preferred design, the encapsulation processes and multi-compartment capsular technology of the present invention may include various desirable properties such as, for example, controlling time-release of key active ingredients or medicaments, prolonging shelf-life of the active ingredients or medicaments, improving palatability, reducing overall production costs and reducing the number of capsules consumed by a patient or consumer as nutritional or therapeutic agents.

The present invention provides novel integrated capsule delivery apparatus and methods for delivering a single dosage, multi-compartment capsule comprising a capsular base and cap configuration, wherein the size and shape of the cap, relative to its sealing relationship with the base, generally eliminates or substantially reduces any potential dead space volume within the internal periphery, of the capsule, thereby functionally negating the opportunity for reaction between an air bubble and one or more active ingredients introduced into the capsule and, accordingly, improving stability of the capsular ingredient(s).

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative, and not restrictive. The scope of the invention is, therefore, indicated by the appended claims, rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed and desired to be secured by United States Letters Patent is:

1. A multi-compartment capsule, comprising: a first receiving chamber comprising at least one ingredient having a first physical state, and a second receiving chamber comprising at least one ingredient having a second physical state,

wherein the first physical state of the ingredient of the first receiving chamber is different from the second physical state of the ingredient of the second receiving chamber, and

wherein the ingredients are pharmaceuticals, medicaments, nutraceuticals, botanicals, extracts, antioxidants, phospholipids, herbal oils, marine oils, vitamins, minerals, carotenoids, hormones, proteins, amino acids, specialty nutrients, probiotics, enzymes, brain support components, mood support components, cardio support components, diet support components, immune support components, laxative support components, inflammation support components, prostate support components sports nutrition components, menopause support components, cholesterol support components, or mixtures thereof.

2. The multi-compartment capsule of claim **1**, wherein the antioxidants comprise: d-alpha tocopherol, beta carotene, tocotrienol, grape seed oil, selenium, vitamin C, or mixtures thereof.

3. The multi-compartment capsule of claim **1**, wherein the brain support components comprise: d-alpha tocopherol, docosahexaenoic acid (DHA), Omega 3 fatty acids, lecithin, choline, coenzyme Q 10, *Ginkgo biloba*, vitamin B 12, or mixtures thereof.

4. The multi-compartment capsule of claim **1**, wherein the mood support components comprise: d-alpha tocopherol, lecithin, docosahexaenoic acid (DHA), Omega 3 fatty acids, S-Adenosylmethione (SAM-e), I-tyrosine, or mixtures thereof.

5. The multi-compartment capsule of claim **1**, wherein the cardio support components comprise: d-alpha tocopherol, tocotrienol, flax oil, fish oil, Omega 6 fatty acids, Omega 3 fatty acids, calcium, magnesium, coenzyme Q 10, or mixtures thereof.

6. The multi-compartment capsule of claim **1**, wherein the diet support components comprise: conjugated linoleic acid, flax seed oil, chromium, zinc, l-carnitine, or mixtures thereof.

7. The multi-compartment capsule of claim **1**, wherein the immune support components comprise: garlic oil, olive leaf oil, d-alpha tocopherol, zinc, Echinacea, or mixtures thereof.

8. The multi-compartment capsule of claim **1**, wherein the prostate support components comprise: saw palmetto, pygeum oil, flax seed oil, pumpkin seed oil, selenium, zinc, *Boswellia serrata* extract or oil, or mixtures thereof.

9. The multi-compartment capsule of claim **1**, wherein the inflammation support components comprise: *Boswellia serrata* extract or oil, guggul oil, Omega 3 oil, ginger oil, curcumin, Holy Basil, or mixtures thereof.

10. The multi-compartment capsule of claim **1**, wherein the sports nutrition components comprise: conjugated linoleic acid, medium chain triglycerides oil (MCT oil), zinc, chromium, *Tribulus terrestris*, 19-nor-d-androstendione, or mixtures thereof.

11. The multi-compartment capsule of claim **1**, wherein the menopause support components comprise: Evening primrose oil, red raspberry oil, licorice root, black cohosh, soy isoflavones, or mixtures thereof.

12. The multi-compartment capsule of claim **1**, wherein the cholesterol support components comprise: sterol esters, guggul oil, d-alpha tocopherol, tocotrienol, garlic extract, zinc or mixtures thereof.

13. The multi-compartment capsule of claim **1**, wherein the extracts comprise: bilberry, black cohosh, cinnamon, dandelion, forskolin, turmeric, green tea, ginseng, fennel seed, fenugreek, curcumin, guarana, garlic, glucosamine, gotu kola, grape seed, ma huang, hesperidin, red rice yeast, spirulina, saw palmetto, St. John's Wort, yohimbe, yohimbine, valerian, kava kava, chamomile, quercetin, oregano, sage, saw palmetto, lavender, or mixtures thereof.

14. The multi-compartment capsule of claim **1**, wherein the ingredients consist essentially of: anticholinergics, anti-nauseants, anti-vertigo agents, histamine-1 receptor antagonists, proton-pump inhibitors, dopamine antagonists, prokinetic

gastric stimulants, serotonin 5 HT3 receptor antagonists, corticosteroids, antihistamines, benzodiazepines, cannabinoids, or mixtures thereof.

15. The multi-compartment capsule of claim **14**, wherein the ingredients consist essentially of: a serotonin 5 HT3 receptor antagonist and a cannabinoid.

16. The multi-compartment capsule of claim **15**, wherein the serotonin 5 HT3 receptor antagonist comprises: dolasetron, granisetron, or ondansetron.

17. The multi-compartment capsule of claim **1**, further comprising a third receiving chamber for incorporating at least one ingredient that is different from the ingredients in the first and second receiving chambers.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 9,241,911 B2
APPLICATION NO. : 14/036521
DATED : January 26, 2016
INVENTOR(S) : Fred H. Miller

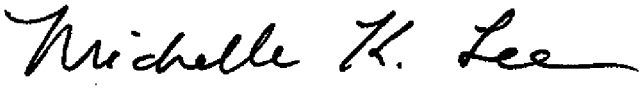
It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Claims

In column 94, claim 4, line 22, please replace "I-tyrosine" with --l-tyrosine--

In column 94, claim 6, line 31, please replace "I-carnitine" with --l-carnitine--

Signed and Sealed this
Third Day of May, 2016



Michelle K. Lee
Director of the United States Patent and Trademark Office